UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Agricultural Economics

DIFFERENTIALS IN PRODUCTIVITY AND IN FARM INCOME OF AGRICULTURAL WORKERS BY SIZE OF ENTERPRISE AND BY REGIONS

By

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PREFATORY NOTE

The basic data underlying this study are limited to the year 1939. Even for that year the data do not afford a complete accounting of production expenses for farms by size of enterprise. Greater precision in the measurement of size-of-enterprise differentials in farm labor productivity and in net farm income must await the collection of more and new types of data on farm employment and agricultural production expenses. Until such time, the findings of this study should be considered preliminary and subject to review in the light of further research which it is hoped this study will stimulate.

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INTRODUCTION

Certain important problems for post-war agricultural policy necessitate careful consideration of both the expected and the desirable levels of efficiency at which agriculture as an industry may or should operate. Post-war planning for agriculture is essentially a process of translating general goals of full employment in the economy as a whole and adequate standard of living for farm people into concrete aims and courses of action. Formulation of the ends sought as well as the means for attaining them are made conditional upon the existence of certain assumed basic conditions. One important assumption, for example, is that relating to the size of the labor force needed for a given volume of agricultural production in the post-war period. Obviously this will depend upon the distribution of the aggregate agricultural production among farms operating at given levels of output per unit of labor. For a given level of production, the total size of the farm working force could vary greatly depending on the assumption as to the average level of gross labor productivity, as the range of levels existing within agriculture as a whole is very great. Another equally important assumption is that relating to the net income level to be obtained from farming by farmers and farm workers, which depends to a large extent upon the net value of production per worker. Regional differences in gross and net production per farm worker are so significant that a realistic approach to post-war agricultural planning must formulate these necessary assumptions in the light of regional variations.

Thus the ensuing estimates and their analysis not only afford a description and interpretation of the differentials in farm labor productivity and levels of living existing in the United States in 1939, but also are relevant to an examination of the effects of alternative assumptions with respect to some of the factors involved in any projected post-war goals. The fundamental variables which enter into equations of post-war agricultural planning are the amount of agricultural production desired, the number of farm workers which would represent a balanced distribution between agriculture and other occupations, and the levels of living to be achieved by persons engaged in agriculture. The measures of gross productivity presented in this report afford converting factors for possible equations between volume of production and number of workers. The measures of net productivity, similarly, afford a basis for expressing quantitatively the interrelations of the total national agricultural production and total number of farm workers with the resulting levels of net farm income per worker.

Contributions made by farms in the different regions of the country and in different size groups to the total value of agricultural production are unequal and their workers are afforded unequal levels of living. But the data hitherto

available have limited analyses of value of production per farm to averages for all farms in the United States or its various subareas. Except in the case of the United States as a whole, moreover, the data have also limited analyses to gross rather than net value of production per farm.

Measures of productivity of agricultural labor and indexes of change in productivity have thus generally been restricted to averages for all farms in an area. In reflecting many of the important aspects of farm labor productivity differentials, such measures are inadequate for several reasons:

(1) Any all-farm average is greatly affected by the inclusion of many enterprises which meet the current Census definition of a farm but which can hardly be considered as productive enterprises when judged directly by their value of production or indirectly by their land, equipment, and other production resources.

(2) The absence of basic data on time input by farm workers has resulted in reliance on the number of workers as the unit to which output is related, with women, children, semi-retired and part-time operators, and full-time workers all counting equally.

(3) It has not been possible to make allowances for farm production expenses and returns to capital investment to obtain measures of net value of output per worker (for regions or size-of-farm classes) as distinguished from a gross value of output per worker.

Special sample tabulations of the 1940 Census of Agriculture for farms classified by total value of agricultural production in 1939, 1/ together with certain recently developed estimates of agricultural production expenses in 1939 by major geographic divisions, 2/ have now permitted the development of estimates for 1939 which throw much light on these unexplored aspects of labor productivity and on the differentials existing in our agricultural structure. In this report estimates of gross and net farm labor productivity are presented for the United States and major geographic divisions, for groups of farms classified by total value of agricultural production in 1939. These productivity measures must be regarded as estimates, as not all data needed are directly available from the sources indicated. In general more reliability is to be attached to the relative differentials indicated by the productivity estimates than to their absolute levels. An account of the procedures used in deriving the estimates along with a discussion of the concepts used and the comparability of these with other productivity and income measures may be found in the Appendix.

1/ Bur. Census, Bur. Agr. Econ. and Farm Sec. Adm., Analysis of Specified Farm Characteristics for Farms Classified by Total Value of Products. U. S. Gov't Print. Off., June 1943.

2/ State Estimates of Expenses and Net Income From Agriculture, 1929, 1939-42. Bur. Agr. Econ., May 1944.

REGIONAL DIFFERENENTIALS IN FARM LABOR PRODUCTIVITY

The types of agricultural enterprises and their forms of organization in the various regions of the United States are conditioned by the patterns of natural resources--soil, rainfall, topography, length of growing season, etc. Perhaps to an equally important extent they are further conditioned by economic and cultural differences among regions which affect the organization and type-of-farming, scale of operations, tenure and credit arrangements, management, and labor-utilization practices of the farming establishments of each region.

The many factors operating to produce regional differences in agriculture lead to marked differences among regions in gross output per farm worker. To illustrate these differences it is convenient to choose the two major geographic divisions which usually show the most extreme differences in measures of production per farm or per worker--the East South Central States which almost always have the lowest values and the Pacific States which usually have the highest. In 1939, the total value of agricultural products sold, traded, or consumed at home averaged only $397 per farm worker in the States of Kentucky, Tennessee, Mississippi, and Alabama, in contrast with a total value of $1,314 per worker in the Pacific States of Washington, Oregon, and California (table 1).3/ The importance of such differentials is great in any consideration of the number of farm workers required to attain given levels of national agricultural production.

Regional differences in gross production per farm worker are to some extent affected by differences in the actual time put into farm work by different classes of workers and by differences in the physical capacity and skills of these classes. The estimated annual average number of farm workers was adjusted in each region to allow for such differences, thus reducing the estimates of the average employment of farm workers to an estimated "man-equivalent" employment. 4/ The fourth column in table 1 shows an adjusted measure of gross labor productivity in which the total value of agricultural production has been related to the estimated average number of "man-equivalent" workers in each major geographic division. Although the absolute value of the resulting measure of productivity is about a fifth to a

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3/ The annual average number of persons employed on farms by value groups was estimated from information provided by the Census on the number of persons working on farms during the last weeks of March 1940 and September 1939. It was assumed that for each value group of farms in a major geographic division, the ratio of its annual average employment to its March-September average was the same as for all farms in that geographic division. The geographic division ratio of annual average farm employment to the March-September average was obtained from the Bur. Agr. Econ. current farm employment series.

4/ The "man-equivalent" unit used in this study represents an approximation to the labor time input and work capacity of the average farm operator who is under 65 years of age and does not work off the farm in excess of 100 days per year. See Appendix pp. 36-38.

fourth higher for each division than the unadjusted measure, the adjustment makes no change in the rank order of the divisions with respect to gross production per farm worker. Thus, insofar as Census and other data permit estimated allowances for the time input and physical capacity of the various classes of farm workers, regional differences in farm labor productivity do not appear to be explained to any appreciable extent by the differences among regions in the proportions of part-time or semi-retired operators or of unpaid family workers.

It is impossible to disentangle the effects of the many factors operating to produce differences in gross productivity of farm workers in the various regions of the country. However, allowance can be made for the part of the gross return which is required to meet the current operating expenses of the farm, to pay taxes, meet depreciation charges, and to yield a reasonable return on all capital investment in land, farm buildings, machinery, and livestock (or to pay rent on these in cases where they are not owned). 5/ When such an allowance is estimated and deducted from the gross value of agricultural products, the remainder can be considered as an estimate of the net returns to labor and management. The last two columns of table 1 show such net returns related to the estimated annual average number of farm workers both on an unadjusted and on a man-equivalent basis.

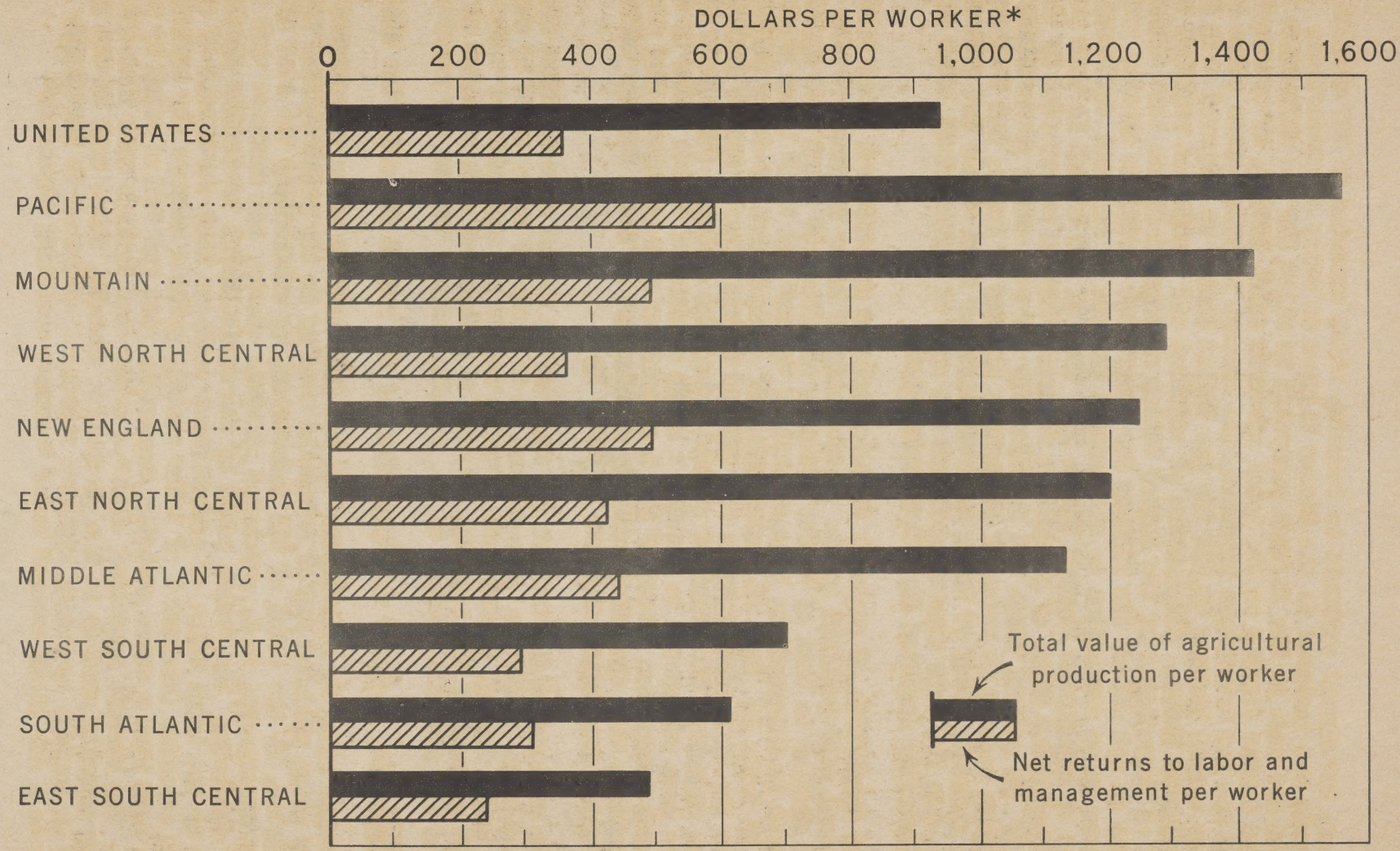
As will be seen in figure 1, these measures of net farm labor productivity still show great regional differentials, although somewhat less marked than in the case of the gross productivity measures. The net returns per worker in the Pacific States was only 2.4 times that in the East South Central States as compared with a ratio of 3.2 for gross productivity (on a man-equivalent basis). Only the Southern divisions fall below the United States average net returns to labor and management of $289 per worker or $356 per man-equivalent worker. Although the highest division and the lowest divisions keep their same ranks on net as on gross productivity, the other divisions are somewhat altered in their relative positions. The West North Central States, partly because of relatively higher overhead costs and greater outlays for farm machinery, fall from third rank on gross productivity to sixth on net returns per worker (man-equivalent), whereas the New England States advance from fourth to second rank.

The measures presented of output per farm worker based on the total value of agricultural production as reported in the 1940 Census of Agriculture may be subject to some downward bias. 6/ For the United States as a whole, the estimate of gross farm income for 1939 made by the Bureau of Agricultural Economics was 9,121 million dollars comparable to the Census figure of 7,814 million dollars.

5/ Expenditures for hired labor (including perquisites) are an expense item when the net returns are computed for farm operators and unpaid family labor, but are not treated as a cost when net returns are computed for all labor, both family and hired.

6/ See Appendix table 10 for estimates of the percentage completeness of reporting to the Census the total value of agricultural production for 1939 by major geographic divisions. The divisions having the smallest percentages were the Pacific States with 78.4 percent and the Middle Atlantic States with 77.4 percent.

GROSS AND NET RETURNS PER FARM WORKER, UNITED STATES AND MAJOR GEOGRAPHIC DIVISIONS, 1939



* *VALUE PER "~~OPERATOR~~ MAN-EQUIVALENT" WORKER.*
ESTIMATES BASED ON DATA FROM 1940 CENSUS OF AGRICULTURE AND B. A. E. PARITY INCOME ESTIMATES.

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FIGURE 1

In addition, Government payments to farmers, which amounted to 807 million dollars in 1939, were not included in the Census figures on value of production. If adjustments are made to the figures presented to allow for the difference between the BAE and Census figures on the total products sold, traded, or consumed by farm households and for Government payments, the average adjusted gross value of production per worker becomes $1,628 for the United States as compared with $1,282 on an unadjusted basis. Comparisons of adjusted and unadjusted regional measures expressed as percentages of the United States averages indicate that although these adjustments do not affect the figures for geographic divisions exactly proportionately, there is no distortion to the general pattern of regional differentials in the Census or unadjusted figures (table 2). Most of the tables in this report are based on unadjusted value of production figures (that is as reported by the 1940 Census). 7/ In general these are satisfactory for reflecting productivity differentials among regions or value of production classes of farms, but they do understate the absolute level of value of production per farm worker and allowance should be made for this when comparisons are made of agricultural labor productivity with productivity measures for other industries.

For comparison of regional differentials in agricultural labor productivity with regional differentials in the productivity of labor in manufacturing industry, a concept similar to that of "value added by manufacture" seems most appropriate. This concept is intermediate between that of "gross" and "net" labor productivity as shown in table 1. From the total value of agricultural products (adjusted upward for the difference between the BAE and Census figures and to include Government payments) the value of current operating expenses (exclusive of labor costs) has been subtracted to provide a rough measure of "value added by the agricultural production process." 8/ A comparison of this value-added measure for agriculture with the value added by manufacture is shown for the United States and each major geographic division in table 3.

The regional differentials are more marked in the case of value added by the agricultural production process than in the case of value added by manufacture. The East South Central States have a "value added" per agricultural worker which is only 57 percent of the national average as contrasted with an index of 162 percent of the national average in the Pacific States, whereas for manufacturing

7/ See Appendix, p. 39 for an explanation of the reason for using the unadjusted figures.

8/ The "value added by manufacture" is the increment in value as measured by the prices of goods produced and of materials used up in the manufacturing process. It is calculated, in the cases of all industries, by subtracting the cost of materials, supplies, containers, fuel, purchased electric energy, and contract work from the value of products. The "value added by the agricultural production process" computed as the total value of agricultural products less the amount of current operating expenses (exclusive of labor costs), gives a measure for agriculture somewhat less than a value strictly comparable with the "value added by manufacture" concept. The current operating expenses subtracted include more than materials and power actually used up in the production process, since some of the items included in current operating expenses represent additions to inventory. See table 3, footnote 2 for items grouped under "current operating expenses."

the lowest and highest percentages are 76 percent of the national average in the South Atlantic States and 122 percent in the Mountain States. There is a general similarity in the ranking of the major geographic divisions with respect to these indications of labor productivity in agriculture and in manufacturing, although the New England States are relatively much lower and the West South Central much higher with respect to value added by manufacture than by agriculture.

Differences in absolute levels of these two series on "value added" reflect differences in many factors other than "net" labor productivity; one of the differences is that with respect to capital investment in the nonlabor factors which enter into the production process. Data are not available as to capital investment in manufacturing by geographic divisions, but the amount of investment in land, farm buildings (other than dwellings), farm machinery and livestock has been estimated and throws much light on the regional differentials in value added by the agricultural production process per worker. Regional differentials in the amount of agricultural resources per worker, as measured by the value of capital investment, 9/ are more marked than in the case of "value added" per worker in agriculture.

The East South Central States have only 45 percent and the Pacific States have 171 percent of the United States average investment per agricultural worker. In the Southern divisions, where the farm labor supply has generally been abundant, labor is a relatively more important factor in the agricultural production process than in other regions of the country. Because of the greater input of labor per unit of output in the South, the ratio of "value added" to the value of capital investment is higher. In the South Atlantic States, the value added by the agricultural production process per $100 capital investment was approximately $30 in 1939; in the West North Central States it was only $17. The low gross and net productivity of farm labor in Southern agriculture reflects its lack of balance between labor and other production factors. 10/

SIZE-OF-ENTERPRISE DIFFERENTIALS IN FARM LABOR PRODUCTIVITY

The regional differences displayed in gross or net farm labor productivity are not explainable in terms of any single factor, but to a large degree they reflect labor productivity differentials that exist among classes of farms when the latter are grouped according to their size of enterprise. Various items might be used as indexes of size of enterprise--value of land and buildings, size of farm (in acres), acres in cropland, number of workers, etc. But if comparisons are to be valid for different parts of the country and for different types of farms, the best single index available is the total value of agricultural production of

9/ The estimates of capital investment per worker include the value of land, etc., whether owned or rented by the farm operator.

10/ For a summary of data on regional differentials in land, equipment, and livestock resources with which the labor resources operate, see Harriet L. Herring, "Some Regional Indices of Agricultural Equipment Basic to Southern Regional Planning," Social Forces, 22 (Oct. 1943) pp. 33-40.

the farm during a given year. The total value of products expressed in dollars serves as a rough common denominator of the effectiveness with which the various resources of land, machinery, livestock, capital, and labor have been combined in one year's agricultural operations. Special tabulations of a 2-percent sample of all farm schedules in the 1940 Census 11/ permit the development of measures of gross and net farm labor productivity for farms classified into 13 groups according to their total value of agricultural products in 1939.

For all farms reporting some value of production in 1939 the average value of production per worker, estimated on an annual average basis, was $772, although this average was not attained on any value groups of farms where the total value of products was less than $1,500 (table 4). Thus 4.6 million farms, or 77 percent of all classified farms, 12/ are in value groups which have an average gross value of production per worker of amounts ranging from $60 to $679, with average productivity in the $1,000 to $1,500 value group still falling short of the average for all farm workers by about 9 percent. These 4.6 million farms had an average annual employment in 1939 of 6,640,000 or 65.6 percent of all farm workers, with 74.7 percent of the annual average number of family workers and 35.9 percent of the hired workers, but the gross value of their production represented only 32.5 percent of the total for all farms. In contrast, the 1.4 million farms in value of production groups of $1,500 or more, with 34.4 percent of the workers, were responsible for the production of 67.5 percent of the total value of products and had an average value produced per worker of from $894 to $2,755.

The tremendous differences between the high and low value classes of farms in productivity per worker shown above are to a considerable degree exaggerated by differences in the time put into farm work and by differences in capacity and skills of different classes of workers. The same types of adjustments were made to allow for such differences in the workers on each value group of farms as were made for geographic divisions.

Although the adjustments modify somewhat the extreme differences between value classes when gross productivity per worker is computed on the basis of the "man-equivalent" employment estimates, the nature and direction of the relationship is not appreciably affected. Thus when an allowance for types of workers in the several value classes is made, the level of worker productivity on low-income farms is still so low in contrast with that of the higher value classes that the conclusion is inescapable that a tremendous amount of underemployment and ineffective employment existed on the farms in 1939.

Table 4 shows also the same types of measures of "net" labor productivity as were estimated for the geographic divisions--that is, gross value of production less operating expenses, taxes, maintenance, or depreciation and return on capital investment and/or rent. The average for all classified farms is $364 per worker

11/ For all farms with value of production of $10,000 or more the tabulations were made for all farms rather than on a sampling basis.
12/ The term "classified farms" refers to those farms which reported some value of agricultural production in 1939 and hence could be classified by total value of products.

(man-equivalent), with farms in the value of production classes of less than $250 showing an average net loss, 13/ whereas farms in the $10,000 or more class showed an average net return to labor and management of $1,311 per worker.

The relationships of gross and net returns per worker to size of farm enterprise as measured by total value of products per farm are shown graphically in figure 2. The curves for both gross and net productivity of farm workers rise rapidly with increasing size of enterprise in the value-of-production classes of less than $2,500. Both continue to rise, though at a slower rate, up to the highest value group of farms, those with a total value of products of $10,000 and over.

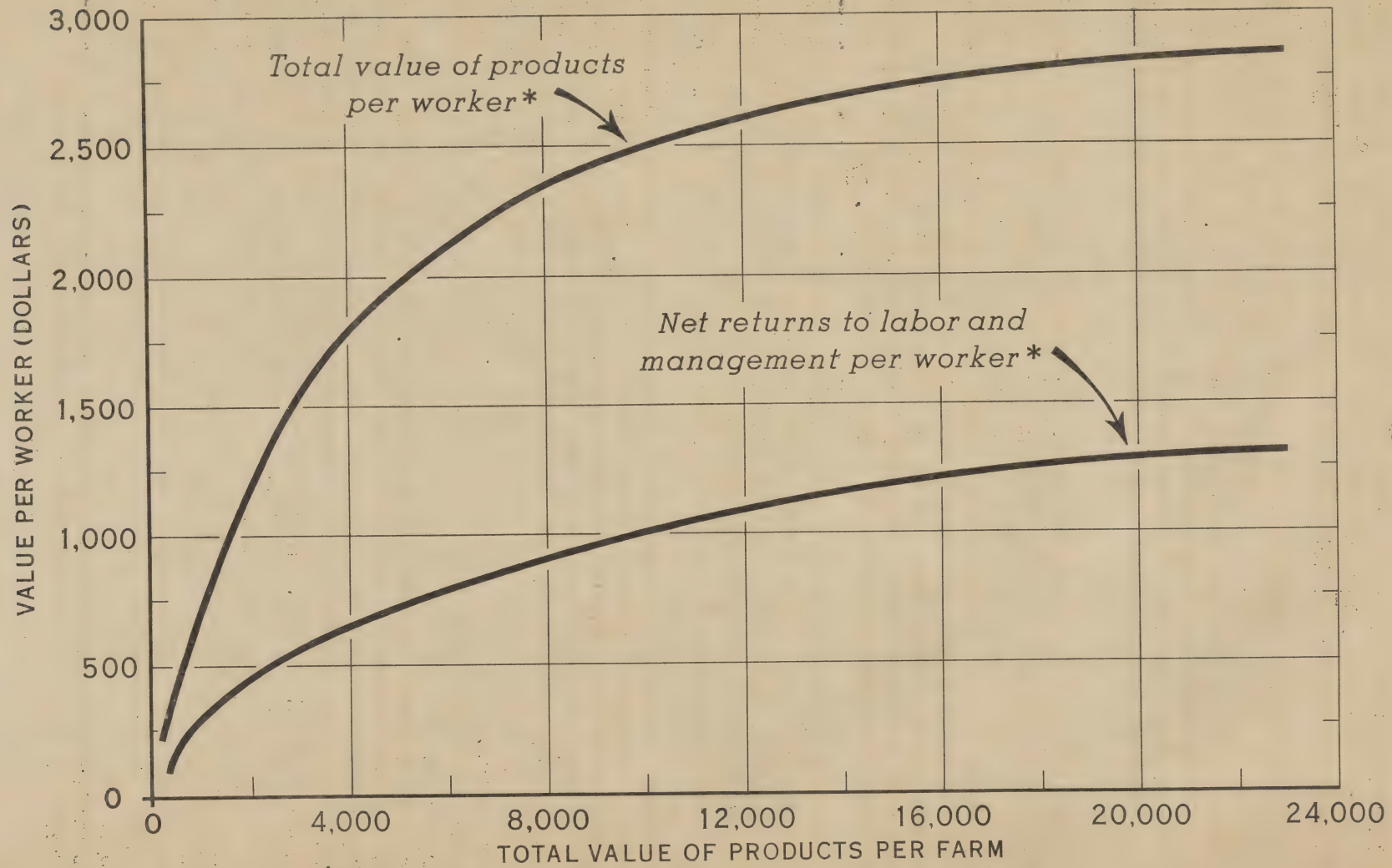
The increases in efficiency of labor utilization with increases in size of farm enterprise, as measured by net returns to labor and management per worker, are most marked in the groups of farms which had a total value of production of less than $1,000 in 1939. It is in this range that the relatively greatest increments in net returns per worker are possible from moderate increases in resource factors other than labor. It is in this range that agriculture in the United States fell farthest below any reasonable standards of affording adequate returns or productive employment to its workers during 1939. 14/

The measures presented on net productivity differentials for farms grouped by size of enterprise need to be examined for validity with respect to the effect upon them of regional differences and of differencesin types of production. The Southern divisions have a larger-than-proportionate share of farms in the lower value of products groups and the Western divisions have a larger-than-proportionate share in the higher value of products groups. Similar estimates of gross and net labor productivity for farms classified by total value of products were developed for each major geographic division separately (table 5). Even though the distribution of farms among the value of production classes differs greatly in the

13/ Several factors are important in interpreting the negative returns shown for the lower value groups of farms. The lowest value of production group includes, in addition to bona fide low-income farms, many "rural residences" technically qualifying as farms, which have higher operating expenses than value of production. The groups also contain a number of farms which normally would have a much higher value of production but because of partial crop failure, other disaster, or the situation of a farm which is just being developed. Moreover certain farms which actually had a higher value of production may be classified in the very low value of production classes because the operator changed and the new operator did not know and hence could not report to the Census the full value of production on the farm during the preceding year. In making the estimates of net returns to labor and management an allowance for a return on capital investment was deducted whether or not such a capital return was actually realized and this method of bookkeeping resulted in showing negative returns for family labor and management.

14/ In a broader social sense, effective use of labor whether it be operators or hired workers would need to be gauged not only in terms of how productive labor is during the time it is actually employed but also in terms of the portion of the year it is employed and the portion of the year it is either unemployed or underemployed. Data are not available on duration of employment of individual workers by value groups of farms and hence these aspects of the problem are not treated in this study.

GROSS AND NET RETURNS PER FARM WORKER, FOR FARMS CLASSIFIED BY TOTAL VALUE OF PRODUCTS, UNITED STATES, 1939



*VALUE PER "~~OPERATOR~~ MAN-EQUIVALENT" WORKER.

ESTIMATES BASED ON DATA FROM 1940 CENSUS OF AGRICULTURE AND B. A. E. PARITY INCOME ESTIMATES

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FIGURE 2

different regions, the measures of gross and net productivity per worker show very similar and very regular progression upward in successively higher value groups for every major geographic division, although not nearly so high absolute values are reached in the Southern as in the other divisions. Only in the East South Central division is there an exception to the regular progression; the maximum net returns to labor and management per worker are reached in the $1,500 to $2,000 class with a gradual and somewhat irregular decline in the higher classes. 15/ Thus while the size of enterprise differentials in net labor productivity for the United States as a whole are exaggerated by a larger-than-proportionate number of Southern farms in the lower value groups and of non-Southern farms in the higher value groups, these regional differences do not explain away the size-of-enterprise differentials, since the latter exist within divisions. 16/

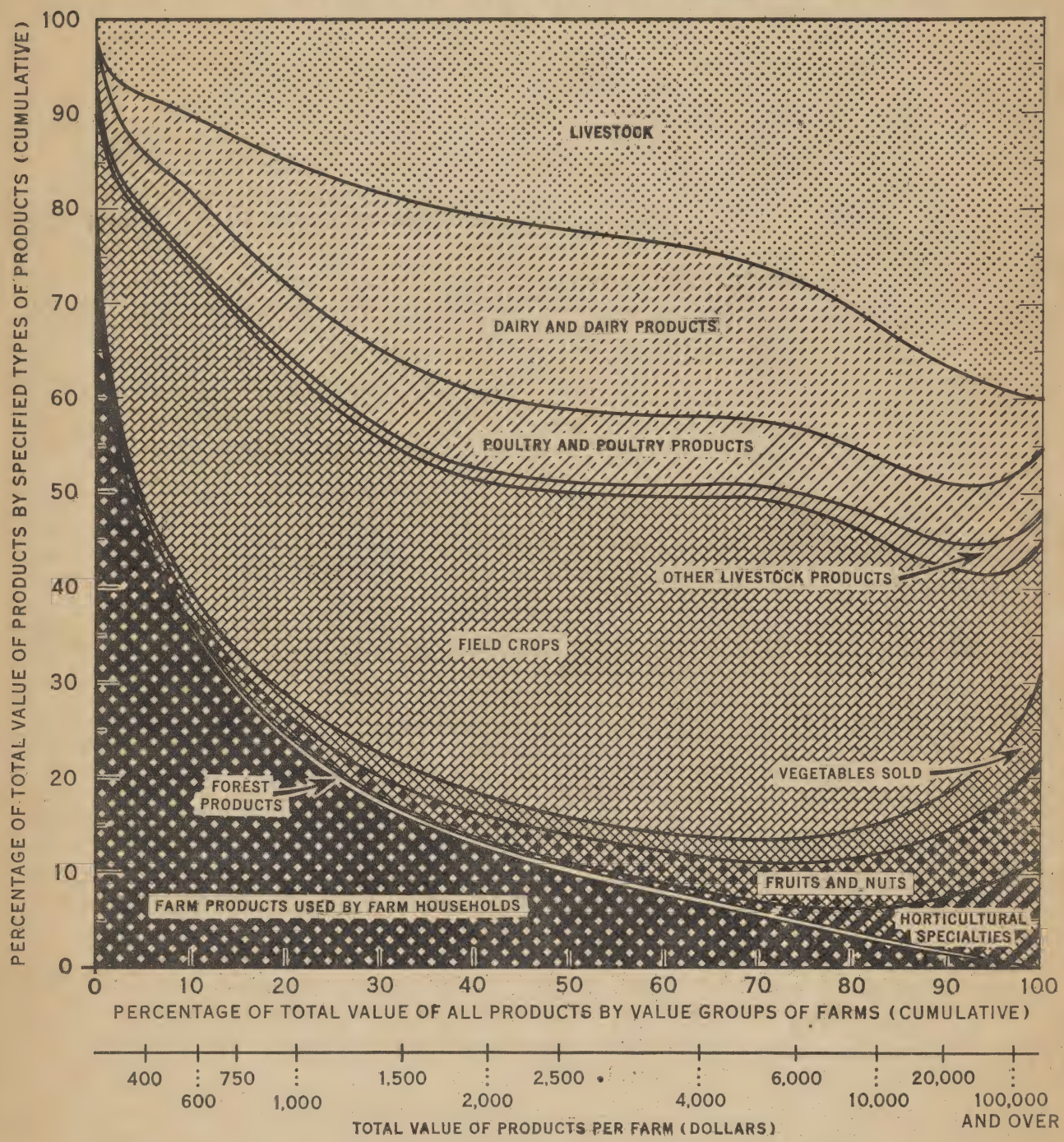
On the other hand, a great part of the regional differences can be accounted for in terms of size-of-enterprise differences. For example, if the East South Central division had the same net returns to labor and management per farm on each of its several value groups of farms as the Pacific States had, but had kept its own distribution of farms by size of enterprise, its all-farm average net production per farm would have been changed only from $303 to $458, in contrast with $1,101 per farm in the Pacific States. Or if the workers on farms in the East South Central States had the same net returns per worker as was the case on farms in corresponding value of production classes in the Pacific States, the all-farm average net returns to labor or management per worker in the East South Central division would have been lower than it actually was.

The size-of-enterprise differentials in both gross and net labor productivity need to be examined also with respect to the types of enterprises in the several value of production classes. The productivity measures for the several value of production groups of farms imply that the composition of production in the several groups is sufficiently similar to permit the making of valid comparisons. Figure 3 shows by an area diagram the broad differences in the types of production occurring in 1939 on farms of different values of output, starting from farms with less than $100 worth of products at the extreme left to farms with

15/ In the South Atlantic and West South Central divisions irregularities in trend occur, but farms with a total value of production of $10,000 or over have higher net returns to labor and management than any other value groups of farms.

16/ It should be recognized that we do not have figures for Southern plantations as operating units since each individual sharecropper unit is reported to the Census as a separate farm. If data were available to treat the plantation as an operating unit, the productivity differentials between large and small farms in the South might be appreciably altered.

CUMULATIVE PERCENTAGE DISTRIBUTION OF TOTAL VALUE OF AGRICULTURAL PRODUCTS BY TYPE OF PRODUCT AND BY VALUE GROUPS OF FARMS, UNITED STATES, 1939



DATA FROM 1940 CENSUS OF AGRICULTURE

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FIGURE 3

over $100,000 at the extreme right. 17/

In some respects, the contrasts are great between the composition of agricultural production of farms with a very low value of products and those with very high values. In the lowest value of products groups, farm products used by farm households make up more than half of the total value of production whereas on the highest income farms the proportion is negligible. Livestock, which makes up less than 7 percent of the value of products on the lowest gross income farms increases progressively until it reaches approximately 40 percent on farms with $100,000 or more value of production per farm. Production for market of vegetables, fruits and nuts, and horticultural specialties begin to comprise sizable fractions of the total value of output only on farms in the highest gross-income classes. In contrast dairy and field crops comprise larger proportions of total value of production on farms in the middle range of income than on the very high or very low income farms. Poultry makes up a fairly constant proportion of agricultural production throughout the income range.

The grouping of all field crops into a single category hides some important differences in types of crops on farms in the different value of products classes. Such specialized products as cotton, tobacco, sugarcane, sugar beets, and potatoes are included in the field-crop category, as are corn, small grains, hay, etc. Cotton and tobacco would no doubt show a heavier concentration on farms in the lower half of the gross-income range whereas the sugar crops, grains, and potatoes would show a relatively greater concentration on farms in the higher gross-income range.

The large percentage of production for home use on the lowest value groups of farms does not represent essentially different commodities, as production for

17/ The entire area of the figure represents 100 percent of the total value of all agricultural production in 1939, with each shaded portion representing the fraction of the entire area which the indicated types of products made up of the total value of agricultural production. For example, the area labeled "field crops" covers 31.6 percent of the entire area of the diagram. This represents the largest percentage of any single group of products. Next in importance is "livestock" with its shaded portion covering 22.6 percent of the entire area; and next is "farm products used by the farm households" which, with 14.5 percent, just barely exceeds "dairy" with 14.3 percent.

From the lower of the two horizontal scales may be read off the size of farm as measured in total value of products per farm, the vertical scale indicating the percentage distribution of total agricultural production on farms of this size by types of product. The upper of the two horizontal scales measures the proportion of the total value of production contributed by farms in successively higher value classes. For example, farms with gross value of products of less than $600 per farm (numbering 2.8 million) contributed only about 11 percent of the Nation's total agricultural production. Thus the production of 47.5 percent of the total number of farms in the United States is represented in the diagram by a strip on the left edge which comprises only about 11 percent of the total area of the chart.

home use which consists of the other types shown, is made up mainly of poultry, dairy products, livestock, field crops, vegetables, and fruits. There is a rapid falling off in the relative importance of the value of home-consumed products from the smallest farms to farms having progressively larger values of output. Even on farms with a gross value of output as low as $500, over 60 percent of the value of their production was sold. This indicates that many small farms engage in commercial production although on a very small scale. Many of these are cotton and tobacco farms.

The fact that livestock sales comprise progressively larger fractions of the value of products on those farms that have higher gross incomes is only partly due to the greater frequency of large-scale livestock operations. In part it arises from the practice of crediting each farm with all sales made during a year, regardless of the length of time the livestock were on the farm. Thus the rapid turnover of animals fed for only a short period of time on certain types of livestock farms tends to cause a considerable proportion of these farms to be classified in the higher value groups and tends to exaggerate the importance of livestock in the production composition of this group.

Contrasts between the very highest and the very lowest gross-income groups are marked, but for the great middle range of farms between income limits of $1,000 and $20,000 per farm, shifts in composition of production from one end of the range to the other are generally very gradual. For farms in this range, which produce 68.5 percent of all agricultural production and 72.4 percent of marketed products in 1939, the average distribution of production by type of products is similar. Individual farms in this gross-income range or in any part of the range would, of course, vary widely in composition of their production, but for any given value group of farms, the percentage composition would be similar to that for other value groups within the range.

Farms with value of products of $20,000 or more in 1939 show considerable differences in average composition of production from farms in the middle range. However, the differences are not great enough to mean a fundamentally different pattern of production. For example, livestock takes first place over field crops, but the latter is the second most important source. Vegetables, fruits and nuts, and horticultural specialties become more important, but combined these three represent less than one-fourth of all production. Therefore, the average production composition on this highest group of farms retains some essential similarity to that on the middle range of farms, even though a large proportion of the individual farms in this group are highly specialized.

In general, we may conclude that there is sufficient homogeneity in type of products to permit valid comparisons of gross and net productivity for all value groups except possibly the very lowest and the very highest. 18/

18/ Although type-of-production data are available for several value groups above $10,000, the necessary information for making estimates of labor productivity is available only for the entire group of farms with value of products per farm of $10,000 or more.

REGIONAL AND SIZE-OF-FARM DIFFERENTIALS IN LEVELS OF LIVING OF PERSONS ENGAGED IN AGRICULTURE

Labor productivity differentials under different combinations of production resource factors are important not only for indicating relative efficiencies in the organization of different sectors of agriculture as a productive industry, but also for their bearing on the level of living of those engaged in agriculture. The annual net returns for a year of agricultural work vary greatly among regions, among groups of farms classified according to total value of production, and between the two major classes of farm workers--family workers, including operators and unpaid members of their families, and hired workers.

Although measures have been presented of average "net returns to labor and management" per worker to indicate differentials in net labor productivity, it should not be inferred that the "net returns" from farming are actually divided among family and hired workers in proportion to their respective inputs of time. The operator and unpaid family workers get what remains from the net returns to labor and management after wages to hired labor are paid. In addition the farmer may receive a net return on capital investment for all or for any fraction owned of the land, farm buildings, machinery, and livestock. To reveal differentials in net income from farming available for family living, it is necessary to develop separate estimates for family and for hired workers and to include in the estimates for farm family workers the returns allowed on owned capital investments.

The average net income from farming for all farm operators in the United States was $693 in 1939 (table 6). 19/ This figure includes an adjustment of the Census figure to the BAE estimates of the comparable value of agricultural production and to include the value of Government payments to farm operators. As the average number of "man-equivalent" family workers employed throughout the year was slightly less than one per farm, the net income from farming per man-equivalent worker is slightly higher--$714. No precisely comparable measure of average income available for family living (either on an individual or family basis) exists for all persons who worked as hired farm laborers during 1939. 20/ If employment of

19/ The net-income concept used here is the same as the "net income to farm operators from farming" used in parity-income computations with the following modifications: (1) Net rent and AAA payments to landlords on farms are not included in these estimates, since all rent on the farm was considered as an expense; (2) the rental value of the operator's dwelling was not included in the estimate of gross income nor were any expenses or allowances for maintenance or depreciation, taxes, etc. allocable to the farm dwellings deducted in arriving at the net income.

20/ Certain data on wage and salary income of individuals and families are available from the 1940 Population Census, but they do not provide the basis for computing the mean wage and salary income of all persons who worked as farm laborers during 1939 nor the mean income of the families of such persons. For all persons in the United States classified as farm laborers in the week of March 24-30, 1940, the median annual wage and salary income received in 1939 was $249 as compared with the median of $763 for all wage and salary workers engaged in nonagricultural occupations. Because the data on wage and salary income are presented in a distribution with an open-end interval, precise computation of the mean income for each group is not possible.

hired workers for 12 months of the year is assumed, the average wage cost per man-year of hired labor can be used as an estimate of the average annual earnings of hired farm laborers. Because not all hired farm workers had 12 months of employment in 1939, however, such an assumption necessarily gives a higher estimate than the actual average for all persons who worked as hired laborers on farms during 1939. 21/

The last two columns in table 6 provide an indication of the net returns from farming per man-year of family labor and per man-year of hired labor for the United States and major regions in 1939. The former varies from $573 in the South to $1,117 in the West, whereas the corresponding figures for hired laborers are $258 and $687. The ratio of the earnings per man-year of hired farm labor to the net farm income per man-year of family labor is lowest in the South, only 45 percent, and highest in the North Central States where it reaches 63 percent. These all-farm regional averages indicate the existing differentials in farm-derived income available for family living among regions and between farmers and farm laborers, even though they do not include any estimate of income derived from non-farm sources.

All-farm averages do not afford a basis for comparing the respective earnings of the family workers and hired farm workers who are working on farms of the same size of enterprise. Similar estimates for the family and hired workers on each group of farms classified by the total value of production in 1939 have been developed on a basis comparable to the Census-reported value of products and excluding Government payments (table 7). These estimates are comparable in income concept to the all-farm estimates shown in the first 3 columns of table 6 for each region. Their exclusion of Government payments means that they understate the net income of farm operators by a larger proportion than they understate the annual wage earnings per hired farm worker.

The net returns to family labor, capital, and management per family and per family worker and the annual wage income per man-year of hired labor are shown in table 7 for the farms of each major region classified by total value of products in 1939. These estimates show the wide differentials existing in net farm-derived income per worker among farm-operator families on the groups of farms classified by size of enterprise. The unequal distribution of farms among gross income classes appears to have its counterpart in the distribution of farmers by net income from farming. This is suggested by the wide range in the average net-farm-income level of farm families in the several gross value of products classes. Farm families in the $1,000 to $1,499 class, who numbered about 700,000, averaged a net farm income of only $537, while the 3,900,000 farm families in successive value groups below the $1,000 limit had progressively smaller average net incomes from farming. In the $2,000-$2,499 value class, where many of the family-size, commercial farms are to be found, the net income from farming averaged less than $1,000 per family, although the 58,000 farmers with gross incomes of $10,000 and

21/ Of the persons in the "experienced" labor force during the last week of March 1940 who were classified as hired farm laborers by the Census, 58.7 percent reported working less than 12 months during 1939.

over averaged a net income from farming of about $8,700. Similar ranges in average net income from farming prevailed in every major region, when farm families are grouped according to total value of products of the farm.

For the United States as a whole, the net returns per family worker exceed the wage income per year of hired labor in every group of farms with value of production of $400 or more. For regions other than the South this is not the case until the value of products per farm exceeds $750 in the Northeast and North Central States or $1,500 in the West. For farms in the successively higher value groups, the net returns per family worker and the wage income per man-year of hired labor show progressive increases, but the former at a much steeper rate of increase. The estimates indicate clearly the great difference in average farm-derived net income available for living per worker between hired workers and family workers on farms of the same size of enterprise in those income groups where hiring of labor is common.

The all-farm average difference between net returns from farming per family worker and wage earnings per man-year of hired labor cannot be interpreted as differences between employer and employee in net income available for family living. It is not possible to derive estimates for making a direct comparison between hired farm workers and the farmers who hired them. In 1939, 62.9 percent of all farms had no expenditures for hired labor at all, and the expenditures reported were heavily concentrated in the upper income classes. The extent of concentration of hired farm workers in the upper income groups is indicated by the following illustration. The average net returns from farming to any group of family workers distributed among value groups of farms in the same proportions as hired workers were distributed in 1939 would have been over $2,400 per worker. This figure stands in sharp contrast to the wage income of $349 per hired worker or the net farm income of $517 per family worker. It indicates that on the average labor is hired in substantial amounts only on farms in the middle and upper income ranges.

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Wartime conditions have substantially raised average farm income and average productivity of farm labor. Material alterations have undoubtedly occurred in the pattern of distribution of farms by gross or net income. Much information is still to be collected before the magnitude of the changes are revealed and before the character of shifts in the structure of the agricultural industry is fully known. The challenging task for post-war years is to achieve a secure and progressively higher level of living for farm people--operators, tenants and wage workers--and to minimize the great inequalities that exist within agriculture.

Table 1.-Total value of agricultural products and net returns to labor and management per farm worker, by United States and geographic divisions, 1939 1/

Area	Number of farms	Total value of products per farm	Total value of products: Per worker	Total value of products: Per man-equivalent worker	Net returns to labor and management: Per worker	Net returns to labor and management: Per man-equivalent worker
	Number	Dollars	Dollars	Dollars	Dollars	Dollars
United States	6,096,799	1,282	765	942	289	356
New England	135,190	606	995	1,244	392	491
Middle Atlantic	348,100	1,687	902	1,129	353	441
East North Central	1,006,095	1,475	954	1,197	336	422
West North Central	1,090,574	1,678	1,046	1,286	294	361
South Atlantic	1,019,451	898	480	608	243	308
East South Central	1,023,349	596	397	486	196	241
West South Central	964,370	995	587	700	243	290
Mountain	233,497	2,085	1,202	1,423	413	488
Pacific	276,173	2,549	1,314	1,558	496	588

1/ The total value of agricultural products is that reported by the 1940 Census of Agriculture and it does not include Government payments to farmers. The net returns exclude Government payments and also the rental value of farm dwellings. See Appendix for sources of data, definition of terms, and methods of deriving estimates.

Table 2. Total value of agricultural products per farm and per farm worker as reported by the Census and as adjusted to the BAE level and to include Government payments, United States and geographic divisions, 1939 1/

Area	Total value of agricultural production as reported in the 1940 Census of Agriculture				Total value of agricultural production adjusted to the BAE level and to include Government payments 2/			
	Per farm		Per man-equivalent worker		Per farm		Per man-equivalent worker	
	Value	Percentage of U. S. average	Value	Percentage of U. S. average	Value	Percentage of U. S. average	Value	Percentage of U. S. average
	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
United States	1,282	100.0	942	100.0	1,628	100.0	1,197	100.0
New England	1,747	136.3	1,244	132.1	2,195	134.8	1,563	130.6
Middle Atlantic	1,687	131.6	1,129	119.9	2,208	135.6	1,480	123.6
East North Central	1,475	115.1	1,197	127.1	1,845	113.3	1,498	125.1
West North Central	1,679	131.0	1,286	136.5	2,074	127.4	1,589	132.7
South Atlantic	898	70.0	608	64.5	1,162	71.4	787	65.7
East South Central	596	46.5	486	51.6	762	46.8	622	52.0
West South Central	995	77.6	700	74.3	1,303	80.0	916	76.5
Mountain	2,085	162.6	1,423	151.1	2,528	155.3	1,720	143.7
Pacific	2,549	198.8	1,558	165.4	3,380	207.6	2,066	172.6

1/ See Appendix for sources of data, definition of terms, and methods of deriving estimates.
2/ Adjusted on the basis of estimates shown in State Estimates of Expenses and Net Income from Agriculture, 1929, 1939-42, Bur. Agr. Econ., June 1944.

Table 3.-Comparison of value added by the agricultural production process with value added by manufacture per worker, United States and geographic divisions, 1939

Area	Value added by manufacture per employee 1/		Value added by the agricultural production process 2/ per worker (man-equivalent)		Capital investment 3/ per farm worker (man-equivalent)		Value added by the agricultural production process per $100 fixed capital investment	
	Value	Percentage of U. S. average	Value	Percentage of U. S. average	Value	Percentage of U. S. average	Value	Percentage of U. S. average
	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
United States	2,762	100.0	867	100.0	4,222	100.0	20.54	100.0
New England	2,261	81.9	950	109.6	3,451	81.7	27.53	134.0
Middle Atlantic	2,862	103.6	952	109.8	3,825	90.6	24.88	121.1
East North Central	3,094	112.0	1,112	128.3	6,053	143.4	18.37	89.4
West North Central	3,084	111.7	1,135	130.9	6,702	158.7	16.93	82.4
South Atlantic	2,092	75.7	583	67.2	1,958	46.4	29.78	145.0
East South Central	2,122	76.8	493	56.9	1,887	44.7	26.12	127.2
West South Central	2,754	99.7	716	82.6	3,379	80.0	21.20	103.2
Mountain	3,372	122.1	1,204	138.9	6,243	147.9	19.29	93.9
Pacific	3,222	116.6	1,409	162.5	7,211	170.8	19.54	95.1

1/ Census of Manufactures, 1939.
2/ Total value of agricultural production (adjusted to the Bur. Agr. Econ. level and to include Government payments) less the following operating expenses: feed purchased, livestock purchased, fertilizer and lime, cost of operating motor vehicles, and a group of miscellaneous expenses consisting of such items as seed, insecticides, containers, electricity for production, twine, ginning, operating gas and steam engines, irrigation, grazing, miscellaneous dairy supplies, blacksmith and miscellaneous hardware supplies, etc.
3/ Total value of land and buildings (less estimated value of dwellings) plus value of livestock and machinery.

Table 4.--Total value of agricultural products and net returns to labor and management per farm worker, by value groups of farms, United States, 1939 1/

Area	Number of farms	Total value of products per farm	Total value of products: Per worker	Total value of products: Per man-equivalent worker	Net returns to labor and management: Per worker	Net returns to labor and management: Per man-equivalent worker
	Number	Dollars	Dollars	Dollars	Dollars	Dollars
United States						
All farms	6,096,799	1,282	765	942	289	356
Classified farms	5,968,755	1,309	772	951	295	364
$1-99	332,195	57	60	82	-122	-164
100-249	812,810	173	151	200	-6	-8
250-399	821,616	320	241	315	79	103
400-599	870,629	491	332	424	138	177
600-749	479,481	669	414	525	184	233
750-999	574,094	865	514	641	215	269
1,000-1,499	708,917	1,222	679	837	264	325
1,500-1,999	416,081	1,726	894	1,087	331	402
2,000-2,499	264,020	2,229	1,086	1,298	399	477
2,500-3,999	375,973	3,111	1,364	1,599	511	600
4,000-5,999	165,679	4,806	1,685	1,926	614	702
6,000-9,999	88,947	7,498	2,097	2,312	799	881
10,000 and over	58,313	22,989	2,755	2,850	1,267	1,311

1/ See Appendix for sources of data, definition of terms, and methods of deriving estimates.

Table 5. Returns per farm and per farm worker, by value groups of farms, United States and geographic divisions, 1939 1/

Area and value group	Number of farms	Returns per farm: Total value of products	Returns per farm: Net returns to labor capital & management: To family labor	Returns per farm: Net returns to labor capital & management: To all labor	Returns per farm: Net returns to labor and management: To family labor	Returns per farm: Net returns to labor and management: To all labor	Returns per worker (man-equivalent): Total value of products	Returns per worker (man-equivalent): Net returns to labor, capital & management: To family labor	Returns per worker (man-equivalent): Net returns to labor, capital & management: To all labor	Returns per worker (man-equivalent): Net returns to labor and management: To family labor	Returns per worker (man-equivalent): Net returns to labor and management: To all labor
	Number	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
United States											
All farms	6,096,799	1,282	502	638	349	485	942	517	469	359	356
Classified farms	5,968,755	1,309	517	656	362	501	951	528	476	370	364
$1-99	332,195	57	-82	-71	-126	-115	82	-129	-102	-198	-164
100-249	812,810	173	22	35	-20	-7	200	29	41	-26	-8
250-399	821,616	320	135	153	87	104	315	150	150	96	103
400-599	870,629	491	239	266	177	205	424	240	230	178	177
600-749	479,481	669	341	376	263	297	525	321	295	247	233
750-999	574,094	865	414	466	310	362	641	388	345	291	269
1,000-1,499	708,917	1,222	537	625	387	475	837	491	428	354	325
1,500-1,999	416,081	1,726	706	848	497	639	1,087	640	534	451	402
2,000-2,499	264,020	2,229	880	1,077	623	820	1,298	791	627	560	477
2,500-3,999	375,973	3,111	1,208	1,512	862	1,166	1,599	1,082	777	772	600
4,000-5,999	165,679	4,806	1,679	2,269	1,161	1,751	1,926	1,523	909	1,053	702
6,000-9,999	88,947	7,498	2,602	3,650	1,809	2,857	2,312	2,477	1,125	1,722	881
10,000 and over	58,313	22,989	8,690	12,948	6,313	10,572	2,850	9,611	1,605	6,982	1,311

1/ See Appendix for sources of data, definition of terms, and methods of deriving estimates.

(continued)

Table 5.-Returns per farm and per farm worker, by value groups of farms, United States and geographic divisions, 1939 1/ (continued)

Area and value group	Number of farms	Returns per farm: Total value of products	Returns per farm: Net returns to labor, capital and management: To family labor	Returns per farm: Net returns to labor, capital and management: To all labor	Returns per farm: Net returns to labor and management: To family labor	Returns per farm: Net returns to labor and management: To all labor	Returns per worker (man-equivalent): Total value of products	Returns per worker (man-equivalent): Net returns to labor, capital and management: To family labor	Returns per worker (man-equivalent): Net returns to labor, capital and management: To all labor	Returns per worker (man-equivalent): Net returns to labor and management: To family labor	Returns per worker (man-equivalent): Net returns to labor and management: To all labor
	Number	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
New England											
All farms	135,190	1,747	606	878	417	689	1,244	778	626	535	491
Classified farms	131,760	1,793	627	906	438	716	1,256	797	634	556	502
$1-99	12,083	53	-101	-83	-196	-179	90	-192	-141	-375	-303
100-249	19,696	167	-13	28	-97	-55	241	-22	41	-161	-79
250-399	15,758	316	84	121	-11	25	397	124	152	-17	32
400-599	13,460	488	89	192	-18	85	509	115	201	-24	89
600-749	6,970	668	224	290	107	173	568	245	246	118	148
750-999	8,866	865	299	375	175	250	781	361	339	211	226
1,000-1,499	13,032	1,229	491	648	305	462	946	566	499	351	356
1,500-1,999	9,310	1,735	722	889	545	712	1,043	787	534	595	428
2,000-2,499	7,006	2,227	765	1,024	558	817	1,280	826	589	602	470
2,500-3,999	11,972	3,140	1,069	1,416	790	1,137	1,658	1,116	748	824	600
4,000-5,999	6,842	4,827	1,669	2,356	1,248	1,934	1,793	1,731	875	1,294	718
6,000-9,999	4,141	7,512	2,929	4,017	2,466	3,553	2,137	2,840	1,143	2,390	1,011
10,000 and over	2,624	22,445	8,597	13,850	7,226	12,479	2,498	10,804	1,541	9,081	1,389

1/ See Appendix for sources of data, definition of terms, and methods of deriving estimates.

(continued)

Table 5.-Returns per farm and per farm worker, by value groups of farms, United States and geographic divisions, 1939 1/ (continued)

Area and value group	Number of farms	Returns per farm: Total value of products	Returns per farm: Net returns to labor, capital and management: To family labor	Returns per farm: Net returns to labor, capital and management: To all labor	Returns per farm: Net returns to labor and management: To family labor	Returns per farm: Net returns to labor and management: To all labor	Returns per worker (man-equivalent): Total value of products	Returns per worker (man-equivalent): Net returns to labor, capital and management: To family labor	Returns per worker (man-equivalent): Net returns to labor, capital and management: To all labor	Returns per worker (man-equivalent): Net returns to labor and management: To family labor	Returns per worker (man-equivalent): Net returns to labor and management: To all labor
	Number	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Middle Atlantic											
All farms	348,100	1,687	629	866	422	659	1,129	686	580	460	441
Classified farms	340,001	1,727	650	892	441	682	1,141	702	589	476	451
$1-99	22,502	54	-112	-98	-194	-180	91	-208	-166	-306	-304
100-249	40,820	168	-28	-8	-117	-97	224	-43	-11	-181	-130
250-399	33,141	318	60	111	-43	9	327	75	115	54	9
400-599	33,170	492	149	215	33	100	480	181	210	40	97
600-749	19,989	670	336	381	218	262	587	354	333	230	230
750-999	27,737	868	377	436	240	300	674	390	338	249	232
1,000-1,499	43,859	1,234	514	628	345	458	872	508	443	341	324
1,500-1,999	31,730	1,732	749	912	540	703	1,402	671	549	484	423
2,000-2,499	22,458	2,233	991	1,213	752	974	1,246	901	677	684	544
2,500-3,999	34,964	3,122	1,325	1,621	1,008	1,303	1,465	1,148	761	873	612
4,000-5,999	16,405	4,804	1,764	2,449	1,295	1,980	1,746	1,580	890	1,160	720
6,000-9,999	8,558	7,462	2,129	3,504	1,395	2,770	2,040	1,866	958	1,222	757
10,000 and over	4,668	22,229	8,267	13,871	6,571	12,175	2,586	8,994	1,614	7,148	1,416

1/ See Appendix for sources of data, definition of terms, and methods of deriving estimates.

(continued)

Table 5.--Returns per farm and per farm worker, by value groups of farms, United States and geographic divisions, 1939 1/ (continued)

Area and value group	Number of farms	Returns per farm: Total value of products	Returns per farm: Net returns to labor, capital and management: To family labor	Returns per farm: Net returns to labor, capital and management: To all labor	Returns per farm: Net returns to labor and management: To family labor	Returns per farm: Net returns to labor and management: To all labor	Returns per worker (man-equivalent): Total value of products	Returns per worker (man-equivalent): Net returns to labor, capital and management: To family labor	Returns per worker (man-equivalent): Net returns to labor, capital and management: To all labor	Returns per worker (man-equivalent): Net returns to labor and management: To family labor	Returns per worker (man-equivalent): Net returns to labor and management: To all labor
	Number	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
East North Central											
All farms	1,006,095	1,475	576	704	391	520	1,197	614	572	418	422
Classified farms	982,475	1,510	595	726	408	539	1,209	628	582	430	431
$1-99	58,009	55	-122	-112	-180	-171	94	-219	-192	-325	-293
100-249	101,909	169	-39	-26	-99	-87	232	-59	-36	-151	-118
250-399	83,976	320	54	78	-20	4	387	73	94	- 27	5
400-599	95,664	495	151	180	63	91	502	172	182	71	93
600-749	63,667	672	248	289	139	180	611	264	263	148	163
750-999	94,760	871	348	395	221	267	742	356	336	225	227
1,000-1,499	153,073	1,234	537	613	376	453	936	501	465	351	343
1,500-1,999	106,612	1,728	758	868	544	654	1,204	683	604	491	456
2,000-2,499	68,971	2,230	912	1,079	658	825	1,463	813	707	587	541
2,500-3,999	94,916	3,101	1,292	1,555	960	1,223	1,841	1,141	923	848	726
4,000-5,999	37,460	4,790	1,838	2,333	1,327	1,823	2,284	1,670	1,112	1,206	869
6,000-9,999	16,425	7,409	3,037	3,782	2,286	3,032	3,106	2,695	1,586	2,029	1,271
10,000 and over	7,033	20,092	8,646	12,129	6,759	10,242	3,923	9,168	2,368	7,167	2,000

1/ See Appendix for sources of data, definition of terms, and methods of deriving estimates.

(continued)

Table 5.--Returns per farm and per farm worker, by value groups of farms, United States and geographic divisions, 1939 1/ (continued)

Area and value group	Number of farms	Returns per farm: Total value of products	Returns per farm: Net returns to labor, capital and management: To family labor	Returns per farm: Net returns to labor, capital and management: To all labor	Returns per farm: Net returns to labor and management: To family labor	Returns per farm: Net returns to labor and management: To all labor	Returns per worker (man-equivalent): Total value of products	Returns per worker (man-equivalent): Net returns to labor, capital and management: To family labor	Returns per worker (man-equivalent): Net returns to labor, capital and management: To all labor	Returns per worker (man-equivalent): Net returns to labor and management: To family labor	Returns per worker (man-equivalent): Net returns to labor and management: To all labor
West North Central	Number	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
All farms	1,090,574	1,679	557	671	357	471	1,286	536	514	344	361
Classified farms	1,066,716	1,716	575	691	372	488	1,300	548	523	355	370
$1-99	42,714	56	-143	-131	-181	-169	84	-231	-195	-293	-252
100-249	86,861	172	-77	-66	-121	-110	219	-103	- 84	-163	-140
250-399	84,519	323	-33	-17	-90	-74	346	-38	-18	-105	-80
400-599	106,897	497	41	67	-34	-9	473	43	64	-36	-8
600-749	74,053	672	150	180	57	88	586	145	157	55	76
750-999	109,974	871	244	286	131	173	699	225	229	121	139
1,000-1,499	168,630	1,233	403	467	245	309	931	358	352	218	233
1,500-1,999	114,446	1,732	603	701	391	488	1,217	520	492	337	343
2,000-2,499	78,346	2,232	801	936	542	677	1,443	677	605	458	437
2,500-3,999	116,971	3,112	1,203	1,422	853	1,072	1,822	997	832	707	627
4,000-5,999	49,101	4,795	1,872	2,238	1,360	1,726	2,434	1,523	1,136	1,106	876
6,000-9,999	22,704	7,448	2,869	3,495	2,097	2,723	3,365	2,319	1,579	1,740	1,230
10,000 and over	11,500	20,692	7,736	9,561	5,669	7,493	5,377	7,107	2,485	5,207	1,947

1/ See Appendix for sources of data, definition of terms, and methods of deriving estimates.

(continued)

Table 5.--Returns per farm and per farm worker, by value groups of farms, United States and geographic divisions, 1939 1/ (continued)

Area and value group	Number of farms	Returns per farm: Total value of products	Returns per farm: Net returns to labor, capital and management: To family labor	Returns per farm: Net returns to labor, capital and management: To all labor	Returns per farm: Net returns to labor and management: To family labor	Returns per farm: Net returns to labor and management: To all labor	Returns per worker (man-equivalent): Total value of products	Returns per worker (man-equivalent): Net returns to labor, capital and management: To family labor	Returns per worker (man-equivalent): Net returns to labor, capital and management: To all labor	Returns per worker (man-equivalent): Net returns to labor and management: To family labor	Returns per worker (man-equivalent): Net returns to labor and management: To all labor
	Number	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
South Atlantic											
All farms	1,019,451	898	443	547	351	455	608	436	371	345	308
Classified farms	1,001,426	915	454	559	361	466	613	442	375	351	312
$1-99	51,944	58	-34	-22	-71	-60	79	-53	-30	-112	-82
100-249	147,518	173	65	78	29	42	193	84	88	38	47
250-399	166,439	320	186	202	147	164	292	198	184	157	149
400-599	183,829	490	315	340	269	293	385	297	267	253	230
600-749	98,648	667	439	470	381	413	464	375	327	326	287
750-999	110,773	861	547	601	476	530	563	469	393	408	346
1,000-1,499	114,329	1,207	729	814	626	711	693	593	467	510	408
1,500-1,999	50,262	1,714	890	1,055	727	893	843	726	519	593	439
2,000-2,499	26,299	2,217	1,128	1,384	910	1,166	952	964	594	778	500
2,500-3,999	29,058	3,078	1,350	1,771	1,025	1,446	1,152	1,255	663	953	541
4,000-5,999	11,176	4,806	1,584	2,472	1,040	1,928	1,172	1,431	603	939	470
6,000-9,999	6,382	7,549	1,832	3,428	891	2,487	1,254	2,292	570	1,115	413
10,000 and over	4,769	22,830	5,858	11,973	3,630	9,745	1,560	9,359	818	5,799	666

1/ See Appendix for sources of data, definition of terms, and methods of deriving estimates.

(continued)

Table 5.-Returns per farm and per farm worker, by value groups of farms, United States and geographic divisions, 1939 1/ (continued)

Area and value group	Number of farms	Returns per farm: Total value of products	Returns per farm: Net returns to labor, capital and management: To family labor	Returns per farm: Net returns to labor, capital and management: To all labor	Returns per farm: Net returns to labor and management: To family labor	Returns per farm: Net returns to labor and management: To all labor	Returns per worker (man-equivalent): Total value of products	Returns per worker (man-equivalent): Net returns to labor, capital and management: To family labor	Returns per worker (man-equivalent): Net returns to labor, capital and management: To all labor	Returns per worker (man-equivalent): Net returns to labor and management: To family labor	Returns per worker (man-equivalent): Net returns to labor and management: To all labor
East South Central	Number	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
All farms	1,023,349	596	327	371	251	295	486	336	303	258	241
Classified farms	1,008,777	604	334	379	258	303	490	342	308	263	246
$1-99	62,979	61	-7	-2	-29	-24	75	-10	-3	-39	-30
100-249	218,150	175	98	104	75	81	184	113	109	86	85
250-399	222,481	319	210	220	179	188	294	216	203	183	174
400-599	207,353	488	334	348	288	303	408	319	291	275	253
600-749	93,290	667	456	477	394	415	506	411	362	355	315
750-999	84,093	857	568	607	476	515	612	520	434	435	368
1,000-1,499	64,299	1,198	692	771	540	618	765	659	492	513	395
1,500-1,999	22,778	1,712	861	1,022	597	758	1,007	868	601	602	445
2,000-2,499	10,720	2,220	899	1,149	508	757	1,244	942	644	531	424
2,500-3,999	12,701	3,087	1,290	1,674	751	1,135	1,179	1,446	639	842	434
4,000-5,999	5,175	4,806	1,307	2,215	513	1,421	1,126	1,578	519	619	333
6,000-9,999	2,963	7,531	1,979	3,292	592	1,905	1,635	2,288	715	685	414
10,000 and over	1,795	19,450	4,015	8,612	941	5,538	1,299	5,630	575	1,320	370

1/See Appendix for sources of data, definition of terms, and methods of deriving estimates.

(continued)

Table 5.--Returns per farm and per farm worker, by value groups of farms, United States and geographic divisions, 1939 1/ (continued)

Area and value group	Number of farms	Total value of products	Returns per farm: Net returns to labor, capital and management: To family labor	Returns per farm: Net returns to labor, capital and management: To all labor	Returns per farm: Net returns to labor and management: To family labor	Returns per farm: Net returns to labor and management: To all labor	Returns per worker (man-equivalent): Total value of products	Returns per worker (man-equivalent): Net returns to labor, capital and management: To family labor	Returns per worker (man-equivalent): Net returns to labor, capital and management: To all labor	Returns per worker (man-equivalent): Net returns to labor and management: To family labor	Returns per worker (man-equivalent): Net returns to labor and management: To all labor
	Number	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
West South Central											
All farms	964,370	995	453	562	303	412	700	461	395	309	290
Classified farms	947,091	1,013	464	575	313	424	706	470	400	317	295
$1-99	45,811	59	-43	-33	-76	-65	79	-61	-43	-108	-87
100-249	138,388	175	52	63	15	26	192	62	69	18	28
250-399	165,862	322	180	193	138	150	304	188	182	144	142
400-599	182,038	491	313	335	258	281	403	300	275	247	230
600-749	94,619	668	433	464	361	392	495	394	344	329	290
750-999	99,953	861	498	557	397	456	583	448	377	357	309
1,000-1,499	96,237	1,209	589	696	427	535	746	541	429	393	330
1,500-1,999	42,833	1,718	750	956	487	693	938	730	522	474	378
2,000-2,499	22,974	2,224	950	1,212	626	887	1,044	901	569	593	417
2,500-3,999	29,357	3,109	1,068	1,497	569	998	1,234	1,111	594	592	396
4,000-5,999	13,452	4,816	1,450	2,169	705	1,423	1,513	1,629	682	792	447
6,000-9,999	8,512	7,566	2,563	3,872	1,401	2,710	1,475	3,257	755	1,780	528
10,000 and over	7,055	25,397	10,458	14,565	5,685	9,792	2,185	14,396	1,253	7,826	843

1/ See Appendix for sources of data, definition of terms, and methods of deriving estimates.

(continued)

Table 5.-Returns per farm and per farm worker, by value groups of farms, United States and geographic divisions, 1939 1/ (continued)

Area and value group	Number of farms	Returns per farm: Total value of products	Returns per farm: Net returns to labor, capital, and management: To family labor	Returns per farm: Net returns to labor, capital, and management: To all labor	Returns per farm: Net returns to labor and management: To family labor	Returns per farm: Net returns to labor and management: To all labor	Returns per worker (man-equivalent): Total value of products	Returns per worker (man-equivalent): Net returns to labor, capital, and management: To family labor	Returns per worker (man-equivalent): Net returns to labor, capital, and management: To all labor	Returns per worker (man-equivalent): Net returns to labor and management: To family labor	Returns per worker (man-equivalent): Net returns to labor and management: To all labor
	Number	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Mountain											
All farms	233,497	2,085	646	937	425	716	1,423	702	639	462	488
Classified farms	224,574	2,168	687	987	458	758	1,450	735	659	491	507
$1-99	16,578	54	-148	-138	-183	-172	77	-231	-197	-284	-247
100-249	27,019	171	-131	-101	-174	-143	199	-176	-118	-233	-168
250-399	21,862	319	-28	-2	-79	-52	339	-34	-2	-94	-55
400-599	21,726	493	-67	-18	-135	-86	445	-73	-16	-149	-78
600-749	13,345	670	-15	81	-91	6	541	-16	65	-92	5
750-999	18,301	868	134	217	42	125	657	138	164	43	94
1,000-1,499	26,967	1,230	314	428	192	306	890	306	310	187	221
1,500-1,999	18,535	1,732	559	748	404	594	1,309	579	565	419	449
2,000-2,499	12,987	2,233	758	990	561	793	1,397	722	619	534	496
2,500-3,999	21,135	3,135	1,096	1,477	848	1,229	1,658	977	781	756	650
4,000-5,999	11,342	4,836	1,504	2,146	1,065	1,707	2,174	1,344	965	952	767
6,000-9,999	7,741	7,590	2,948	4,161	2,194	3,408	2,665	3,005	1,461	2,237	1,197
10,000 and over	7,036	23,399	9,714	13,613	6,939	10,837	3,582	10,023	2,084	7,159	1,659

1/ See Appendix for sources of data, definition of terms, and methods of deriving estimates.

(continued)

Table 5.-Returns per farm and per farm worker, by value groups of farms, United States and geographic divisions, 1939 1/ (continued)

Area and value group	Number of farms	Returns per farm: Total value of products	Returns per farm: Net returns to labor, capital, and management: To family labor	Returns per farm: Net returns to labor, capital, and management: To all labor	Returns per farm: Net returns to labor and management: To family labor	Returns per farm: Net returns to labor and management: To all labor	Returns per worker (man-equivalent): Total value of products	Returns per worker (man-equivalent): Net returns to labor, capital, and management: To family labor	Returns per worker (man-equivalent): Net returns to labor, capital, and management: To all labor	Returns per worker (man-equivalent): Net returns to labor and management: To family labor	Returns per worker (man-equivalent): Net returns to labor and management: To all labor
	Number	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Pacific											
All farms	276,173	2,549	716	1,194	484	962	1,558	885	730	597	588
Classified farms	265,935	2,647	755	1,250	515	1,011	1,578	918	745	627	603
$1-99	19,575	53	-193	-167	-250	-223	75	-335	-235	-434	-314
100-249	32,449	169	-145	-106	-214	-175	222	-233	-140	-343	-230
250-399	27,578	319	-37	4	-111	-70	388	-55	4	-164	-85
400-599	26,492	491	18	81	-72	-8	481	23	80	-95	-8
600-749	14,900	669	136	208	40	113	605	161	188	48	102
750-999	19,637	866	203	304	68	169	775	244	272	82	151
1,000-1,499	28,491	1,225	304	461	133	290	938	333	353	146	222
1,500-1,999	19,575	1,729	354	602	178	426	1,034	384	360	194	255
2,000-2,499	14,259	2,230	577	900	339	662	1,300	598	525	351	386
2,500-3,999	24,899	3,141	861	1,326	581	1,046	1,582	875	668	590	527
4,000-5,999	14,726	4,840	1,091	2,021	693	1,623	1,851	1,087	773	691	621
6,000-9,999	11,521	7,596	2,071	3,448	1,499	2,875	2,470	2,058	1,121	1,489	935
10,000 and over	11,833	26,284	10,016	15,854	8,270	14,107	3,058	10,790	1,844	8,908	1,641

1/ See Appendix for sources of data, definition of terms, and methods of deriving estimates.

Table 6.--Net farm income per farm operator family and per family worker, and wage income per man-year of hired farm labor, comparable with total value of products reported by the Census and adjusted to the BAE level and to include Government payments, United States and major regions, 1939 1/

Area	Comparable with value of products reported by the Census			Adjusted to the BAE level and to include Government payments		
	Net income to farm operators from farming		Wage income per man-year of hired labor 2/	Net income to farm operators from farming		Wage income per man-year of hired labor 3/
	Per farm family	Per man-equivalent farm family worker		Per farm family	Per man-equivalent farm family worker	
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
United States	502	517	349	693	714	413
Northeast	622	710	418	824	940	533
North Central	566	572	431	776	784	492
South	407	410	223	568	573	258
West	684	795	562	961	1,117	687

1/ See Appendix for sources of data, definition of terms, and methods of deriving estimates.
2/ Or annual wage income per worker, assuming 12 months of employment. The estimates in this column were based on an adjusted estimate of the total wage bill (including value of perquisites) to make it comparable with the Census-reported total value of production.
3/ Or annual wage income per worker, assuming 12 months of employment.

Table 7.--Net farm income per farm operator family and per family worker, and wage income per man-year of hired farm labor, by value groups of farms, United States and major regions, 1939 1/

Value group	United States			Northeast			North Central		
	Net returns to family: labor, capital, and management		Wage income per man-year of hired labor 2/	Net returns to family: labor, capital, and management		Wage income per man-year of hired labor 2/	Net returns to family: labor, capital, and management		Wage income per man-year of hired labor 2/
	Per farm family	Per man-equivalent family worker		Per farm family	Per man-equivalent family worker		Per farm family	Per man-equivalent family worker	
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
All farms	502	517	349	622	710	418	566	572	431
Classified farms	517	528	349	644	726	418	585	584	432
$1-99	-82	-129	176	-108	-202	259	-131	-224	272
100-249	22	29	153	-22	-36	267	-56	-81	217
250-399	135	150	152	67	90	289	11	13	257
400-599	239	240	166	131	163	388	93	101	276
600-749	341	321	164	307	327	237	195	197	261
750-999	414	388	185	358	384	203	293	282	247
1,000-1,499	537	491	240	509	520	301	466	424	314
1,500-1,999	706	640	292	743	694	278	677	597	353
2,000-2,499	880	791	325	938	886	320	853	739	392
2,500-3,999	1,208	1,082	367	1,260	1,141	319	1,243	1,059	456
4,000-5,999	1,679	1,523	424	1,736	1,620	413	1,857	1,583	495
6,000-9,999	2,602	2,477	478	2,390	2,162	511	2,940	2,508	607
10,000 and over	8,690	9,611	595	8,386	9,586	697	8,081	7,821	744

1/ See Appendix for sources of data, definitions of terms, and methods of deriving estimates.
2/ Or annual wage income per worker, assuming 12 months of employment.

(continued)

Table 7.--Net farm income per farm operator family and per family worker, and wage income per man-year of hired farm labor, by value groups of farms, United States and major regions, 1939, 1/ (continued)

Value group	South			West		
	Net returns to family labor, capital, and management		Wage income per man-year of hired labor 2/	Net returns to family labor, capital, and management		Wage income per-man year of hired labor 2/
	Per farm family	Per man-equivalent family worker		Per farm family	Per man-equivalent family worker	
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
All farms	407	410	223	684	795	562
Classified farms	417	417	223	724	828	563
$1-99	-26	-37	121	-172	-284	196
100-249	76	91	102	-139	-204	282
250-399	194	202	105	-33	-45	272
400-599	321	306	115	-20	-25	242
600-749	442	393	115	64	71	322
750-999	536	476	148	170	189	292
1,000-1,499	671	590	175	309	319	362
1,500-1,999	832	752	228	453	481	392
2,000-2,499	1,019	937	240	663	660	428
2,500-3,999	1,223	1,228	260	969	925	477
4,000-5,999	1,475	1,536	296	1,271	1,201	578
6,000-9,999	2,205	2,741	310	2,425	2,432	660
10,000 and over	7,998	11,600	392	9,904	10,496	743

1/ See Appendix for sources of data, definition of terms, and methods of deriving estimates.
2/ Or annual wage income per worker, assuming 12 months of employment.

APPENDIX

METHODS USED IN MAKING THE ESTIMATES PRESENTED IN THIS REPORT

I Methods of Estimating Agricultural Employment for Farms Classified by Total Value of Products

The report of a cooperative study issued jointly by the Bureau of the Census, Bureau of Agricultural Economics, and the Farm Security Administration, Analysis of Specified Farm Characteristics for Farms Classified by Total Value of Products, presents data on farm workers and other items for farms classified by total value of products in 1939 and supplies the basic information for estimating agricultural employment for the several value groups of farms. As these Census data on agricultural employment relate only to 2 weeks (March 24-30, 1940 and September 24-30, 1939), certain additional indications were also used on the relation of agricultural employment in these 2 weeks to the annual average agricultural employment in each major geographic division as estimated by the Bureau of Agricultural Economics in its regular farm-employment series. 1/ Table 8 (p.45-6) indicates the procedures for obtaining estimates of the annual average agricultural employment for the 2 years 1939 and 1940 for all farms in each major geographic division. For the several value groups of farms within each major geographic division, estimates were derived similarly on the assumption that for each value group of farms the ratio of its annual average employment to its March-September average was the same as that for all farms in the geographic division.

The resulting estimates of annual average agricultural employment for each value group of farms in each major geographic division are not precisely comparable with the BAE estimates of farm employment. The estimates by value groups of farms are based on the agricultural employment figures reported in the Census, which included only persons 14 years of age and over, whereas the BAE farm-employment series has no lower age limit. The estimates for the value groups of farms include no allowance for possible underreporting in April 1940 of persons employed on farms in September 1939, whereas the BAE farm-employment series, although based on material from the decennial Census, includes an upward adjustment to allow for a memory bias. As a result of these two differences our estimated 1939-40 annual average employment on all farms in the United States, 10,214,000, falls short of the BAE estimate of 10,662,000 by 448,000.

Because the agricultural employment figures derived for the several value groups of farms were to be used with 1939 production data in developing measures of labor productivity, it would have been preferable to have the estimates of agricultural employment relate to the single year 1939 rather than to the 2 years 1939 and 1940. However, since the data available related to 1 week in each calendar year, the estimates were developed on the 2-year rather than on the 1-year basis.

1/ The Bur. Agr. Econ. farm employment figures for April 1, 1940 and October 1, 1939 relate to the same reporting weeks as used by the Census. The Bur. Agr. Econ. April and October estimates of farm employment were used in making the estimates, but these will be referred to as March and September figures to correspond with the Census-reporting weeks.

The difference between the 1939 annual average farm employment and the 1939-40 average as estimated in the BAE farm-employment series is only 78,000, or 0.7 percent of the 1939 annual average.

The chief assumption involved in the methods used for distributing the annual average employment for all farms in a major geographic division among the value groups of farms in that division is that the ratio of the annual average employment to the March-September average is the same for every value group of farms in a major geographic division. The assumption does not imply that the same pattern or amplitude of seasonality holds for each value group of farms in a division. The March week is usually less than the annual average and the September week usually greater than the annual average so that a value class with a greater seasonal swing than the average for all farms might still have its annual average employment satisfactorily estimated by the methods used if its March employment was relatively lower and its September employment relatively higher than the corresponding figures for all farms.

When the estimates of annual average employment for the value classes were related to estimates of total value of production or to net returns to labor, capital and management, tremendous differences in productivity per worker were revealed between the high and low value of production classes of farms. Such differences are exaggerated by differences in the actual time put into farm work by different classes of workers and by differences in the physical capacity and skills of different classes of workers. It is not known how many hours of work are represented by one person in the annual average employment, estimated to correspond in definitions with the Bureau of Agricultural Economics series (with the exception of excluding children under 14 working on farms for whom the 1940 Census gives no information). But it is known that on the average it is by no means equal to 2,500 hours (250 days of 10 hours), the number sometimes taken to represent full-time agricultural employment during a year. Some persons are included who regularly have full- or part-time nonfarm jobs, but who in addition do the equivalent of 2 days' work on the farm each week during the year. Such a person would show up as one worker in the annual average employment just as if he had worked full time the year around. For other persons working on such a basis for only a fraction of the weeks of the year, one worker in the annual average employment might represent two or three such persons. Similarly, persons are included who work only in agriculture, but who because of age, physical capacity, school attendance, or other duties, work fewer hours than full-time during the weeks for which they are credited in the annual average figures as being employed in farm work.

Overlapping the question of how much work time is associated with a given annual average employment figure is the question of capacity and skill of the several classes of persons working on farms, which would vitiate the process of adding together hours worked by the different classes of persons even if such information were available. A woman or a man over 65 generally is not considered the equivalent of a young adult male in farm work for three reasons: (1) the person is less likely to work during as many weeks of the year; (2) during weeks worked the equivalent of 2 days, and hence supposedly included in the annual average estimates, the number of hours worked is likely to be less than 60, or whatever number is taken as standard for a full-time adult worker; (3) during hours actually worked physical

capacity and/or lesser degree of skill is likely to mean less farm work accomplished per hour worked by such workers than by young adult males.

Data are not available to make precise estimates of the allowances in input of labor which should be made for the different classes of workers for each of these reasons. The estimate of annual average number of workers has attempted to allow for the first - that is, for the fraction of weeks worked during the year. For the second two, a joint allowance was made, since data are not available for precise estimates for the separate factors, and only very rough adjustments can be attempted.

For the estimates of annual average numbers of workers by classes of workers, each was converted to an estimate of the number of "man-equivalent" workers by an adjustment factor which represents a rough attempt to allow for differences in labor input arising from the last two factors described. For operators, an estimate was made of the number of operators 65 years of age and over or part-time to the extent of working off the farm 100 days or more who were included in the annual average estimate of operators, and to this number was applied a conversion factor of .5. Similarly, to all unpaid family workers a conversion factor of .5 was applied. "Full-time" operators under 65 years of age and hired workers were given a conversion factor of 1.0. Table 9 shows the method used in converting the annual average employment estimates to "man-equivalent" employment estimates for all classified farms in each major geographic division. Similar procedures were used for each value group of farms within a geographic division with the percentage shown in line 6 for the part-time or over-65-year-old operators computed from data relating to that particular value group.

The estimate of part-time or over-65-year-old operators represented in the annual average was obtained for all classified farms and for the value groups of farms as follows. On the basis of March employment figures, an estimate was derived of the number of operators included in the employment figures who were 65 years of age or more or who were working off the farm for at least 100 days during the year. This number was expressed as a percentage of all the operators estimated as working during the last week in March (number of farms reporting family labor) and the percentage applied to the previously computed estimate of annual average number of operators working. The estimate of the number of aged or part-time operators included in the March employment figures was derived for each value group of farms on the basis of the following procedures. From the sum of operators 65 years of age and over and of operators reporting 100 or more days of work off the farm in 1939 was subtracted the number of farms reporting no labor on that date. It was assumed that there was no overlapping of these two groups and that in case a farm reported no labor it was because the operator was in one of these categories. Hence the difference obtained by the subtraction was used as an estimate of the number of operators 65 years of age and over or who worked off the farm for 100 days or more--that is, semi-retired, or part-time operators--who were included in the March employment figure. When the estimated percentage was obtained for the March number of operators estimated as included in the employment figures, it was then applied to the average annual estimated number of operators to obtain an estimate of the semi-retired or part-time operators represented in the annual average, so that a conversion factor of .5 could be applied to these types of operators.

Rough as these adjustments for input of time and physical capacity are, they represent an attempt to make allowances in the right direction. The employment on the farms in the lower value groups is reduced much more than that on farms in the higher groups. The conversion reduces the annual average employment on farms reporting less than $100 total value of products by 26.0 percent, but reduces the employment on farms of $10,000 or more by only 3.3 percent. It should be noted that the conversion to "man-equivalents" does not convert to a truly full-time man-equivalent of 2,500 hours per year. It merely attempts to make estimates of labor input from the various classes of workers comparable, by estimating in terms of the number of hours per year averaged by operators who are under 65 years of age and who do not work off the farm as much as 100 days per year as a unit, even though this number of hours is not itself estimated.

II Method of Estimating Production Expenses and Net Returns to Labor, Capital, and Management for Farms Classified by Total Value of Products

To afford a measure for reflecting net-income differentials on farms of different sizes of enterprise, production expenses were estimated and subtracted from the total value of products for each value of production class to obtain an estimate of net returns to labor, capital, and management. For comparisons of differential in returns to family and hired labor, the cost of hired labor was also deducted to obtain a net income from farming for operators and unpaid family labor.

The two sources of data used in estimating production expenses and net returns to labor, capital, and management or to family labor, capital, and management for farms classified by total value of products were Analysis of Specified Farm Characteristics for Farms Classified by Total Value of Products 2/ and estimates of production expenses made by the Bureau of Agricultural Economics. 3/ The production expenses for major geographic divisions by the same categories of expense shown in "Net Farm Income and Income Parity Summary, 1910-42" were used in developing the estimates of farm production expenses and net returns for the value classes of each major geographic division. The Census data provide information on seven types of farm expenditures in 1939, but not all of these are properly classifiable as expense of production for a given year. The general procedure used was to develop estimates

2/ Analysis of Specified Farm Characteristics for Farms Classified by Total Value of Products, Bur. Census, Dept. of Commerce; Bur. Agr. Econ., and Farm Sec. Adm., Dept. of Agr.; U.S. Govt. Print. Off., Washington, 1943.

3/ Harry C. Norcross, State Estimates of Expenses and Net Income from Agriculture, Bur. Agr. Econ., May 1944. These estimates were made available to the authors in preliminary form in advance of publication. Minor revisions were later made in some of the statistics on production expenses and imputed rent. These revisions were not of a sufficiently great magnitude to justify revisions to the estimates developed in this report.

of production expenses as classified by BAE from these Census data on expenditures and from other relevant Census data available by value groups of farms.

The first general problem was to establish a basis of comparability between the over-all Census aggregate and the BAE aggregate value of agricultural production during the year 1939. The Census figures on total value of products supposedly correspond to the BAE estimate of gross farm income when Government payments and rental value of dwellings are excluded. However, the two aggregates for the year 1939 are as follows:

Census- - - - - - - - - - - - -	$7,814,000,000
BAE- - - - - - - - - - - - - - -	$9,121,000,000

The Bureau of Agricultural Economics has developed certain estimates, by types of products, of the amounts by which the Census understates gross value of agricultural production in 1939. One possible method of achieving correspondence between the two basic sets of data to be used in the estimates would be to adjust upward the Census figures on total value of products to allow for underreporting. However, since the basic classification of farms on which all the estimates were to be made was in terms of total value of products as reported by the Census, any adjustments to the Census data on total value of products would have involved complications in every step, requiring a prohibitive amount of extra work and fairly elaborate interpolations. Although adjusting the total value of products might have been preferable, it was not feasible and hence the alternative course was followed of adjusting downward the BAE estimates of production expenses in order to use them with the Census figures on total value of production.

It was assumed that the BAE correctly estimates agricultural production expenses in relation to its estimates of total value of agricultural production. Therefore, production expenses to be deducted from the total value of production shown by the Census were estimated as the amount bearing the same ratio to the Census reported total value of products as shown in the BAE estimates. The resulting estimate of production expenses is only 85.7 percent (7,814 million dollars ÷ 9,121 million dollars) as great as the corresponding BAE estimate. Hence each BAE item of expense used in developing the estimates was reduced by 14.3 percent. 4/

The assumption involved in choosing this basis for obtaining correspondence between the Census total production and BAE total expense may be examined by comparison with the results which would be obtained under the alternate procedure of adjusting the Census-reported value of products upward to equal the BAE estimate of total value of products. By the only method of adjustment simple enough to be feasible, the group of farms included in any one value group, except the highest and lowest, would have its class limits raised when its mean value of products was adjusted upward so as to maintain the same ratio of expenses to the total value of products as in the method actually used. If after such estimates had been developed interpolation procedures had been used to obtain a regrouping of farms by the class

4/ This percentage applies to the average reduction for the entire United States. Actually the estimates of expenses were developed separately for each major geographic division and the summed total of the division figures was used for the United States.

intervals as published in the Census, the resulting group of farms in a specified class interval (other than the highest or lowest) would have approximately the same relation of expenses to total value of products as is estimated by the methods we have used. Thus the expense-income relations and per farm values obtained from this alternate procedure would have been practically the same as those shown in this report for all value groups of farms except the highest and the lowest.

The effect of the alternate procedure would have been in general to shift upward the distribution of farms by total value of production. In the lowest and highest class intervals, farms with less than $100 or more than $10,000 value of production, a slightly different ratio of expenses to total value of products would have been obtained, if the alternate method had been used. In the highest value of production class, the additional farms which would have been added to it from the next lower class by an upward adjustment of total value of products would, of course, tend to be concentrated near the lower limit of the class interval. If the alternate procedure had been used, the resulting ratio of expenses to total value of products would have been slightly higher for the group of farms with value of production of $10,000 and over. The effect on the relations in the lowest class interval is scarcely worth considering.

The concept of production expenses used in these estimates differs in certain respects from the concept used by BAE. For the year 1939, the BAE estimate of total production expenses to farm operators was $6,032,000,000 (excluding Government payments to landlords). Before the over-all adjustment downward was made to the estimate of expenses the following adjustments were made to the estimates cited. The value of the expenses incident to housing was deducted, since the value of housing is not included in the Census figure on total value of products. It was assumed that maintenance, taxes, interest, insurance, etc. were equivalent to the rental value of dwelling as estimated by BAE, $636,000,000, 5/ and this amount was deducted from the BAE estimate of operating expenses. Next, the BAE estimate of rent paid to landlords living on farms, $185,000,000 was added to the production expenses. While the parity-income concept of "net income to persons on farms from farming" includes net rent to landlords living on farms, such an inclusion in the income ascribable to one particular value of production group of farms would have credited this group with farm income actually derived from some other farm, possibly in a different value of production class. These two modifications to the parity-income concept of "net farm income" and "production expenses" in addition to the over-all downward adjustment to the Census-reported level of gross income resulted in an adjusted estimate of farm-production expenses of $5,581,000,000 and an estimate of net returns to family labor, capital, and management of $3,033,000,000 for the year 1939 to be used with the Census data for all farms in the United States.

An estimate of net returns to all labor, capital, and management was derived from the above estimate of net returns to family labor, capital, and management by adding to it the total farm wage bill after it had been adjusted in the same way as all other production expenses. In the construction of measures of productivity, estimates of these net returns to family labor, capital, and management were related to the estimated annual average number of family workers employed, and estimates of

5/ This figure was later revised to 619 million dollars.

net returns to all labor, capital, and management were related to the estimated annual average total farm employment.

Actual adjustments to BAE estimates of expenses to obtain comparability in level and coverage with the Census data were made separately for each major geographic division. The BAE estimates of all production expenses were reduced in each major geographic division by the ratio of the Census-reported total value of production to the corresponding BAE estimates of total production, table 10. These percentages vary from 77.4 in the Middle Atlantic division to 90.3 in the West North Central. As the several categories of expenses comprise varying proportions of production expenses in the different regions, the United States totals for each category of expenses derived by summing the estimates of the expenses for each of the geographic divisions is not identical with the amount obtained by reducing each expense estimate for the United States as a whole by 14.3 percent. The United States estimates for value groups of farms derived as the sum of regional estimates have been used in this report as they seem to be logically preferable. However, the differences between the two sets of estimates are not important in the case of any expense item.

The method of distributing most of the categories of production expenses for all farms of a major geographic division to the value of products classes of farms within that division was to assume that the distribution was proportional to the same or the most closely related item on which Census data were available by value groups of farms. For example, the estimate of total wages to hired labor was distributed to the several value of production classes in proportion to the amount of cash wages to hired labor reported; maintenance or depreciation on machinery and equipment was distributed in proportion to reported expenditures for machinery and equipment; taxes and farm-mortgage interest were distributed in proportion to the estimated value of land and buildings or owner-operated farms after an adjustment had been made to allow for the value of dwellings; rent was distributed in proportion to the estimated value of rented land and buildings after similar adjustments had been made for dwellings; feed purchased was distributed in proportion to the actual expenditures reported for feed; livestock purchased was also distributed in proportion to the expenditures reported for feed; etc. The exact procedures for distributing the estimated expenses by categories among the value of production classes of farms is illustrated for the East South Central division in table 11.

In the case of the expense items for which the distributions of the aggregate in each major geographic division were estimated from related expense items, the assumptions underlying the procedure were examined in the light of available relevant information. In most cases, such as estimation of the maintenance of depreciation on machinery from the distribution of reported expenditures for machinery and equipment, a priori grounds seem to indicate a satisfactory degree of validity, given the control of major regional differences afforded by having the aggregates available by major geographic divisions and given the situation of making such estimates not for individual farms but only for relatively large groups of farms classified by total value of products within a division.

In the case of estimating the distribution of expenses for livestock purchased by the known distribution of feed purchased, additional explorations were made by

using the indirect indications of the relation between value of animals purchased per farm and expenditures for feed per farm, available by States for each major geographic division. Although there were marked differences between groups of divisions in the slopes of the regression of value of animals purchased per farm on expenditures for feed per farm, the relationships for States within divisions were fairly close and linear. Insofar as the different States in a division can be used as rough indicators for value groups of farms with the same total value of products per farm as the State, these regressions substantiate the validity of the estimating procedures used. The regressions of most of the States of the East North Central, West North Central, South Atlantic, East South Central, and West South Central divisions were so similar that only one line was required to indicate the nature of the relationships in these 28 States. For the New England and Middle Atlantic States the regression of animals purchased per farm on expenditures for feed per farm had a much more gradual slope than in the case of other divisions as such a large proportion of feed is purchased in these two divisions.

If for each major geographic division information on value of animals purchased per farm and expenditures for feed purchased per farm had been available for value groups of farms rather than for States, their correlations for these two series would undoubtedly have shown up as closer than in the case of States. The range of diversity in nature of enterprise is greater for all the farms of a State than for the farms of a major geographic division falling in one value group approximating the State in mean value of products, and this diversity would be expected to result in lower correlations for State means than for value class means.

The aggregate value of livestock purchased, which was distributed according to the value of feed purchased within each major geographic division averaged about 7 percent of the total production expenses, ranging from less than 2 percent in New England States to nearly 14 percent in the West North Central States. With the control afforded of available aggregates for major geographic divisions and the indirect indications of a close relation between per farm expenditures for livestock purchased and feed purchased within major geographic divisions, it is not likely that inaccuracy in the estimating procedures used could be great enough to distort appreciably the resulting per farm estimates of production expenses or net income for value groups.

For a group of miscellaneous operating expenses 6/ a somewhat less direct method of estimating their distribution by value groups of farms was used. The Census provides information as to the amounts of expenditures during 1939 by value groups of farms for each of 7 items: Commercial fertilizer, liming materials, feed, implements and machinery, gasoline distillate, etc. building materials, and hired labor.

6/ Including horses and mules, seed, insecticides, containers, electricity for production, twine, ginning, operating gas and steam engines, irrigation, grazing, fire, windstorm and hail insurance, crop insurance, miscellaneous dairy supplies, blacksmith and miscellaneous hardware supplies, miscellaneous greenhouse and nursery expenses, veterinary bill and medicines, sugar tolls, and total short-term interest; see Net Farm Income and Income Parity Summary, 1910-42.

When these are expressed as average expenditures for all farms in each value of production group of farms, each expenditure item shows a very close and approximated linear relation to the sum of the seven expenditures and (except in the case of the very lowest value groups) to the per farm total value of products. The regularity and linearity of these regressions is striking in view of the diversity of the type of expenditures for which the Census provides information.

The relationships afford evidence that for a given aggregate expense item for the farms of a particular geographic division (from BAE estimates), either the distribution of other expense items or of the total value of products could afford a fair basis of estimating the unknown distribution of the known aggregate. 7/ For miscellaneous operating expenses the percentage distribution among value groups of farms within a geographic division was assumed to be the same as that for the sum of all the current operating expenses which had been estimated from some directly related item on which the Census afforded expenditure data. The expenses which were allocated to the value groups of farms by this indirect process amounted to about 15 percent of all production expenses, varying from 11.7 percent in the West North Central division to 18.8 percent in the East South Central.

III Method of Estimating Production Costs (Including Capital Costs) and Net Returns to Labor and Management for Farms Classified by Total Value of Production

The production expenses as estimated in the previous section include (1) total wages to hired labor, (2) current operating expenses, (3) maintenance or depreciation and (4) overhead expenses including taxes, farm-mortgage interest, and rent on farms not owned. To estimate net returns to labor and management alone,

7/ If for the expenses on which we have no direct information as to distribution among value groups, linearity of their relationship with total value of products per farm had been assumed, an estimating equation could have been developed for estimating each expenditure from total value of products per farm, since the mean expenditures per farm for all farms in major geographic divisions is known from the BAE estimates and the regression line could have been assumed to pass through the origin or to have only a very small intercept on the expenditure axis when the value of products per farm is zero. Estimates of the distribution of the 7 expenditure items for which information is available made in this manner check very closely with the actual Census reported expenditures. However, the relationships of the known items to their sum were more uniformly linear than their relationships to mean value of products and hence the method adopted was to assume that similar relationships would hold between each of the unknown expense items and the sum of known expenses. The simple form of the estimating procedure used which distributed the unknown expenses in proportion to the known, involved the assumption that the estimating line pass through the origin. This assumption seemed justified both from logical grounds and from an examination of the regression line of each known expense item on the sum of all known items.

it was necessary to estimate returns on fixed capital investment and on capital invested in implements, machinery, and livestock as elements in total production costs. In the concept of total production costs have been included total wages to hired labor, the current operating expenses, maintenance or depreciation and taxes, as estimated previously. An over-all allowance for interest on production capital and/or net rent has been substituted for farm-mortgage interest and for net rent on rented farms. For estimating capital costs or rent on land and buildings (other than dwellings), the interest rate on farm-mortgage debt outstanding prevailing in 1939 was applied to the Census-reported value of land and buildings less an adjustment for value of dwellings. It was assumed that for renters this estimate could be used for net rent and for owners that it could be used as a net rate of return on fixed-capital investment.

In addition to rent or return on fixed-capital investment, estimates were made for returns on capital investment in implements and machinery and in livestock. For the former the interest rate on farm-mortgage debt outstanding was applied to the Census-reported value of implements and machinery adjusted to the BAE estimate for the United States, January 1, 1940. The BAE estimate of value of livestock on farms, January 1, 1940, was distributed among regions in proportion to the value of livestock products sold during 1939, as reported by the Census. The capital charges on investments in livestock were computed by applying the interest rate on farm-mortgage debt outstanding to this estimated value of livestock on farms.

As in the case of production expenses, the estimates entering into the total production costs were reduced for each major geographic division by the ratio of the Census-reported to the BAE-estimated total value of production. The reason for making such a reduction was that these production costs were to be subtracted from the Census reported total value of production to obtain measures of net returns to labor and management. As it was not feasible to adjust upward the Census figures on total value of production, the estimated production costs were adjusted downward to make them comparable to the Census-reported value of production. The procedures used in distributing the estimates of capital costs among the value of production classes in a given major geographic division are illustrated for the East South Central division in table 11.

The total production costs described above were subtracted from total value of products to obtain an estimate of net returns to family labor and management for each major geographic division. The estimate of the annual average employment of family labor was related to this estimate of net returns to family labor and management as an indication of family labor productivity. To obtain a similar measure for all labor, the total wages to hired labor were combined with these net returns to obtain an estimate of net returns to all labor and management. This latter estimate was related to the total annual average employment to obtain a measure of net productivity of all labor.

Table 8.-- Method of estimating average annual agricultural employment, United States and major geographic divisions, 1939-40 1/

Item	UNITED STATES 2/	New England	Middle Atlantic	East North Central	West North Central
Estimated annual average agricultural employment, 1939-40					
(1) Total (line 2 + line 5)	10,214,000	238,000	651,000	1,556,000	1,749,000
(2) Family workers (line 3 + line 4)	7,836,000	153,000	450,000	1,259,000	1,458,000
(3) Operators (line 8)	4,994,000	106,000	279,000	828,000	925,000
(4) Unpaid family workers (line 13)	2,842,000	47,000	171,000	431,000	533,000
(5) Hired workers (line 18)	2,378,000	85,000	201,000	297,000	291,000
Basis of estimates					
(6) Farms reporting family labor, March 1940		106,846	281,327	839,819	941,051
(7) Farms reporting family Labor, Sept. 1939		104,863	276,770	815,890	909,581
(8) Average of lines (6) and (7)		105,854	279,048	827,854	925,316
(9) Unpaid family labor, March 1940 (Family labor reported less line (6))		51,300	163,497	424,063	499,798
(10) Unpaid family labor, Sept. 1939 (Family labor reported less line (7))		53,664	167,740	422,641	491,690
(11) Average of lines (9) and (10)		52,482	165,619	423,352	495,744
(12) Ratio of 1939-40 annual average number of unpaid family workers to average for September 1939 and March 1940 (BAE) 3/		.899	1.030	1.019	1.075
(13) Product of lines (11) and (12)		47,181	170,588	431,396	532,925
(14) Hired workers reported, March 1940		55,769	137,122	227,835	213,466
(15) Hired workers reported, September 1939		102,100	249,040	366,491	367,176
(16) Average of lines(14) and (15)		78,935	193,081	297,163	290,321
(17) Ratio of 1939-40 annual average number of hired workers to average for September 1939 and March 1940, (BAE)		1.070	1.041	.998	1.003
(18) Product of lines (16) and (17)		84,460	200,997	296,569	291,192

(Continued)

Table 8.--Method of estimating average annual agricultural employment, United States and major geographic divisions, 1939-40 1/ (continued)

Item	South Atlantic	East South Central	West South Central	Mountain	Pacific
Estimated annual average agricultural employment, 1939-40					
(1) Total (line 2 + line 5)	1,907,000	1,537,000	1,636,000	405,000	535,000
(2) Family workers (line 3 + line 4)	1,440,000	1,279,000	1,212,000	278,000	307,000
(3) Operators (line 8)	828,000	834,000	800,000	185,000	209,000
(4) Unpaid family workers (line 13)	612,000	445,000	412,000	93,000	98,000
(5) Hired workers (line 18)	467,000	258,000	424,000	127,000	228,000
Basis of estimates					
(6) Farms reporting family labor, March 1940	840,904	850,393	819,104	188,393	214,011
(7) Farms reporting family labor, Sept. 1939	814,379	817,473	779,783	182,266	204,797
(8) Average of lines (6) and (7)	827,642	833,933	799,444	185,330	209,404
(9) Unpaid family labor, March 1940 (Family labor reported less line (6)	605,182	501,825	430,700	87,643	94,871
(10) Unpaid family labor, Sept. 1939 (Family labor reported less line (7)	717,162	646,320	538,404	91,146	94,201
(11) Average of lines (9) and (10)	661,172	574,072	484,552	89,394	94,536
(12) Ratio of 1939-40 annual average number of unpaid family workers to average for September 1939 and March 1940 (BAE) 3/	.926	.775	.851	1.033	1.035
(13) Product of lines (11) and (12)	612,245	444,906	412,354	92,344	97,845
(14) Hired workers reported, March 1940	401,361	197,827	285,375	86,072	148,614
(15) Hired workers reported, September 1939	563,423	328,431	654,111	177,398	313,312
(16) Average of lines (14) and (15)	482,392	263,129	469,743	131,735	230,963
(17) Ratio of 1939-40 annual average number of hired workers to average for Sept. 1939 and March 1940 (BAE)	.969	.979	.903	.966	.988
(18) Product of lines (16) and (17)	467,438	257,603	424,178	127,256	228,191

1/ This table shows the method for estimating the average annual agricultural employment of persons 14 years of age and over for all farms in each major geographic division. The method was actually applied to each value group of farms in a division, on the assumption that the ratios derived for all farms and shown in lines (12) and (17) were applicable to each value group of farms in the division.

2/ United States estimate obtained by summing estimates for major geographic divisions.

3/ Unpaid family workers estimated by subtracting the number of farms used in the BAE estimates of family employment from the BAE estimate of family workers. The BAE estimates of farm employment for October 1, 1939 and for April 1, 1940 were used as the dates corresponding to the Census-reporting weeks.

Table 9.--Method of estimating annual average "man-equivalent" agricultural employment for all classified farms, United States and major geographic divisions, 1939-40 1/

Item	UNITED STATES 2/	New England	Middle Atlantic	East North Central	West North Central	South Atlantic
Estimated annual average man-equivalent agricultural employment						
(1) Total workers (line 2 + line 5)	8,218,000	188,000	515,000	1,227,000	1,408,000	1,493,000
(2) Family workers (line 3 + line 4)	5,851,000	103,000	315,000	932,000	1,118,000	1,028,000
(3) Operators (line 11)	4,440,000	80,000	230,000	718,000	854,000	724,000
(4) Unpaid family workers (line 13)	1,411,000	23,000	85,000	214,000	264,000	304,000
(5) Hired workers (line 14)	2,367,000	85,000	200,000	295,000	290,000	465,000
Basis of estimates						
(6) Annual average number of operators		104,623	276,000	818,079	913,422	820,112
(7) Estimated percentage of operators included in annual average who are 65 years of age or over or working off farms 100 days or more 4/ (percent)		47.9	33.3	24.6	13.0	23.4
(8) Estimated number of semi-retired or part-time operators (line 6 X line 7)		50,124	91,872	200.870	119,044	192,160
(9) Semi-retired or part-time operators (in man-equivalents) (line 8 X .5)		25,062	45,936	100,435	59,552	96,080
(10) Other operators (line 6 - line 8)		54,499	184,131	617,209	794,378	627,952
(11) All operators (in man-equivalents) (line 9 + line 10)		79,561	230,067	717,644	853,900	724,032
(12) Annual average unpaid family workers 3/		46,324	169,614	427,980	529,272	608,680
(13) Annual average unpaid family workers (in man-equivalents) (line 12 X .5)		23,162	84,807	213,990	264,636	304,340
(14) Annual average hired workers		84,370	199,937	295,426	289,795	464,684

(continued)

Table 9.--Method of estimating annual average "man-equivalent" agricultural employment for all classified farms, United States and major geographic divisions, 1939-40, 1/ (continued)

Item	East South Central	West South Central	Mountain	Pacific
Estimated annual average man-equivalent agricultural employment				
(1) Total workers (line 2 + line 5)	1,244,000	1,360,000	337,000	446,000
(2) Family workers (line 3 + line 4)	988,000	937,000	211,000	219,000
(3) Operators (line 11)	766,000	732,000	166,000	170,000
(4) Unpaid family workers (line 13)	222,000	205,000	45,000	49,000
(5) Hired workers (line 14)	256,000	423,000	126,000	227,000
Basis of Estimates				
(6) Annual average number of operators 3/	826,727	790,563	181,203	204,885
(7) Estimated percentage of operators included in annual average who are 65 years of age or over or working off farms 100 days or more 4/ (percent)	14.7	14.8	17.3	33.9
(8) Estimated number of semi-retired or part-time operators (line 6 X line 7)	121,666	117,222	31,320	69,416
(9) Semi-retired or part-time operators (in man-equivalents) (line 8 X .5)	60,833	58,611	15,660	34,708
(10) Other operators (line 6 - line 8)	705,061	673,341	149,883	135,469
(11) All operators (in man-equivalents) (line 9 + line 10)	765,894	731,952	165,543	170,177
(12) Annual average unpaid family workers 3/	443,128	409,086	90,424	96,982
(13) Annual average unpaid family workers (in man-equivalents) (line 12 X .5)	221,564	204,543	45,212	48,491
(14) Annual average hired workers	256,144	423,077	126,015	227,420

1/ This table shows the method of converting the estimated annual average employment for all classified farms into "man-equivalent" employment for each major geographic division. The method was actually applied to each value group of farms in a division, with a percentage comparable to that shown in line 7 estimated from data relating to the particular value group.

2/ Estimates for United States obtained by summing estimates for the major geographic divisions.

3/ Estimates for farms reporting some amount of production in 1939 (classified farms) were obtained by procedures similar to those shown in Table 8 for all farms.

4/ This percentage was derived from the summed results for all the value classes in a division. For each value class of a division the percentage was estimated as the excess of the sum of operators 65 years of age and over and operators reporting 100 days or more of off-farm work over farms not reporting labor in March 1940, expressed as a percentage of all farms reporting family labor in March 1940.

Table 10.—Comparison of 1940 Census and BAE estimates of total value of agricultural production, 1939

Area	Total value of products sold, traded, or consumed at home, Census	Total value of agricultural production, Bureau of Agricultural Economics 1/	Census as percentage of Bureau of Agricultural Economics
	1,000 dollars	1,000 dollars	Percent
UNITED STATES	7,813,645	9,120,560	85.7
New England	236,200	291,755	81.0
Middle Atlantic	587,180	758,213	77.4
East North Central	1,483,761	1,737,579	85.4
West North Central	1,830,750	2,027,310	90.3
South Atlantic	915,828	1,106,166	82.8
East South Central	609,665	691,185	88.2
West South Central	959,647	1,068,602	89.8
Mountain	486,785	541,750	89.8
Pacific	703,829	898,050	78.4

1/ BAE estimate of total farm income excluding Government payments and rental value of dwelling.

Table 11.-Illustration of procedures used in estimating agricultural production expenses, total production costs, and net returns, by value groups of farms, East South Central division, 1939

Line no.	Item	BAE estimate except where otherwise specified 1/	BAE estimate adjusted to total value of products reported by Census 2/	. . .	Illustrative estimates for one value group: farms reporting total value of products of $400-$599 3/
		1,000 dollars	1,000 dollars		1,000 dollars
1	Total value of products sold, traded, or consumed by farm households	691,185	609,666		101,234
2	Net returns to family labor, capital and management (1) - (3)	379,225	334,499		69,179
3	Production expenses (4) + (5)	311,960	275,167		32,055
4	Wages to hired labor	51,430	45,364		3,081
5	All other expenses (6)+(12)+(16)	260,530	229,803		28,974
6	Current operating expenses (7) +(8)+(9)+(10)+(11)	161,777	142,697		19,473
7	Feed purchased	26,565	23,432		2,816
8	Livestock purchased	9,985	8,807		1,058
9	Fertilizer and lime	33,611	29,647		5,560
10	Operation of motor vehicles	32,731	28,871		2,951
11	Miscellaneous operating expenses	58,885	51,940		7,088
12	Maintenance or depreciation (13)+(14)+(15)	51,350	45,294		4,759
13	Buildings (excluding dwellings)	18,125	15,987		1,368
14	Motor vehicles	16,394	14,461		1,673
15	Machinery and equipment	16,831	14,846		1,718
16	Overhead expenses (17)+(18)+(19)+(20)	47,403	41,812		4,742
17	Taxes (unadjusted)	27,345	24,033		2,917
18	Farm-mortgage interest (unadjusted)	16,996	14,991		1,820
19	Rent (unadjusted)	32,744	28,882		5,447
20	Less adjustment for dwellings	-29,583	-26,094		-5,442
21	Net returns to all labor, capital and management (2) + (4)	430,655	379,863		72,260
22	Total value of products sold, traded or consumed by farm households	691,185	609,666		101,234
23	Net returns to family labor, capital and management (22) - (24)	291,665	257,266		59,788
24	Total production costs (25) + (26) + (30)	399,520	352,400		41,446
25	Current operating expenses, wages to hired labor and maintenance or depreciation (4) + (6) + (12)	264,557	233,355		27,313
26	Interest allowance on capital and/or rent	118,186	104,247		12,775
27	Land and buildings other than dwellings	90,987	80,256		10,761
28	Machinery and implements	6,908	6,093		705
29	Livestock	20,291	17,898		1,309
30	Taxes on land and buildings other than dwellings	16,777	15,441		1,358
31	Net returns to all labor and management (4) + (23)	343,095	302,630		62,868

See pages 51-54 for footnotes.

Footnotes for Table 11

1/ Line 1. Cash income from marketings, $481,593,000 + value of products consumed at home, $209,592,000 = $691,185,000.

Line 4. Wages to hired labor including value of perquisites.

Line 11. Includes all operating expenses not elsewhere specified.

Line 13. BAE estimate of maintenance or depreciation on all buildings, $38,523,000, less estimated maintenance or depreciation on dwellings, $20,398,000. Adjusted for maintenance and depreciation on all dwellings estimated as 1.1056 times BAE estimate of depreciation and repairs on operators' dwellings, $18,450,000. The ratio of the value of all occupied farm dwellings to operators' dwellings was obtained by assuming for the East South Central division the same percentage increase over the 1930 ratio of 106.93 percent as occurred in the corresponding ratio between the years 1930 and 1939 for the United States, or a 3.39 percent increase.

Line 20. The estimates for taxes, farm-mortgage interest, and rent in lines 17, 18, and 19 included the taxes, interest, and rent paid on dwellings. The adjustment shown on this line allows for the portion of taxes, interest, and net rent allocable to the dwellings on the farm. It was estimated by assuming that the BAE estimate of value of housing, $49,981,000 is equal to the total cost of housing. From the rental value of farm dwellings was subtracted the allowance for maintenance or depreciation already estimated of $20,398,000, leaving $29,583,000 as the adjustment for dwellings to be used here.

Line 27. From the total value of land and buildings reported by the Census the estimated value of farm dwellings was subtracted to obtain the value of land and buildings other than dwellings, $2,324,737,000 minus $505,000,000 = $1,819,737,000 Capital costs on investment in land and farm buildings of the owner-operators (or the rental paid for land and farm buildings for tenants) was estimated at 5 percent, the rate of interest on farm-mortgage debt outstanding in the East South Central division in 1939.

Line 28. The total value of implements and machinery on farms in the United States on January 1, 1940, as estimated by the BAE, was distributed among the geographic divisions in proportion to value of implements and machinery reported in the 1940 Census. For the East South Central division, this gave an estimate of $138,154,000, or 86 percent of the value reported by the Census. The capital costs on this investment were estimated as 5 percent, the rate of interest on farm-mortgage debt outstanding in the East South Central division in 1939.

Line 29. The total value of livestock on January 1, 1940 as estimated by the Bureau of Agricultural Economics was distributed among the major geographic divisions in proportion to the value of livestock sold during the year 1939 as reported in the Census. For the East South Central division, this gave an estimate of $406,000,000. The capital costs on this investment were estimated as 5 percent, the rate of interest on farm-mortgage debt outstanding in the East South Central division in 1939.

Line 30. The adjustment for dwellings shown in line 20, $29,583,000 was prorated to taxes, farm-mortgage interest, and rent in proportion to the amounts of each of these items. This adjustment reduced the unadjusted amount of taxes shown in line 17, $27,246,000, to $16,777,000.

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2/ All entries in this column except in line (1) were obtained by assuming that each specified item of expenses or cost bore the same relation to the total value of products sold, traded, or consumed at home as shown in the first column of BAE estimates. Applying this assumption actually involved multiplying each entry in the first column by .882058 to obtain the corresponding entry in this column.

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3/ Line 1. 1940 Census of Agriculture.

Line 4. Total value of wages to hired labor (including perquisites) for the East South Central was distributed among value classes in proportion to the Census-reported cash expenditures for hired labor.

Line 7. Total value of feed purchased for the East South Central division was distributed among value classes in proportion to Census-reported value of feed purchased.

Line 8. Total value of livestock purchased for the East South Central division was distributed among value classes in proportion to the Census-reported expenses for feed purchased.

Line 9. Total value of fertilizer and lime purchased for the East South Central division was distributed among value classes in proportion to the Census-reported expenditures for fertilizer and lime.

Line 10. Total cost of operating motor vehicles for the East South Central division was distributed among value groups in proportion to Census-reported expenditures for gasoline, distillate, etc.

Line 11. Total miscellaneous operating expenses for the East South Central was distributed among value classes in proportion to the sum of other current operating expenses.

Line 13. The total value of the estimate of maintenance or depreciation on farm buildings (excluding dwellings) for the East South Central division was distributed among value classes in two steps. First, an estimate of maintenance or depreciation on all buildings was distributed among value classes in proportion to the Census-reported expenditures for building materials. Next, the estimated adjustment of the part of this amount allocable to maintenance or depreciation on dwellings was distributed among value classes in proportion to the estimated value of dwellings in each value class. (The total amount of this adjustment for the East South Central division is $2,398,000, comparable with the level shown in column 1 or $2,398,000 X .882058 = $2,115,000.) The estimates of the aggregate value of farm dwellings for each value group of farms were derived, first, on a per farm basis from an estimating equation utilizing information on the value of land and buildings per farm and the value of products used by farm households per farm. The weights were derived as those which would satisfy two conditions: To give an estimated mean value of dwellings per farm for all farms equal to the BAE-derived estimate of $493; to give a mean value per farm of $4,000 on the value group of farms with gross value of production per farm of $10,000 or more. (For all other major geographic divisions the mean value of dwellings per farm on the group of farms with value of products per farm of $10,000 or over was estimated at $5,000 except in the case of New England, where it was estimated at $6,000.) On the basis of the per farm value of dwellings for each value class and the number of farms in the value class, the estimate was derived of the aggregate value of dwellings in each value class.

Line 14. Total maintenance or depreciation on motor vehicles for the East South Central division was distributed among value classes in proportion to the Census-reported expenditures for implements and machinery.

Line 15. Total maintenance and depreciation on machinery and equipment for the East South Central was distributed among value classes in proportion to the Census-reported expenditures for implements and machinery.

Lines 17-20. Taxes, and farm-mortgage interest were estimated for the owners within a value group and rent was estimated for the renters in a value group. Taxes, interest, and rent were estimated for the entire value of land and buildings and then an over-all adjustment was made to deduct that portion of taxes, interest, and rent allocable to dwellings. On the assumption that each farm in a value class had a value of land and buildings equal to the mean of that value class, the value of land operated by owners was estimated as the percentage of owned farms times the value of land and buildings and similarly the value of rented land and buildings was estimated as the proportion of tenant-operated farms times the total value of land and buildings in the value class. The estimates of taxes and farm-mortgage interest for the East South Central division were distributed among value classes in proportion to the estimated value of land and buildings owned; the estimate of rent for the East South

Central division was distributed among value classes in proportion to the estimated value of rented land and buildings.

The adjustment for dwellings was distributed among value classes in proportion to the estimated value of dwellings in each value class. (The method of estimating the value of dwellings for each value group of farms is explained in the procedures for line 13.)

Line 27. Interest allowance on capital and/or rent on total value of land and buildings was first estimated, then an allowance for dwellings was subtracted from this estimate. The total estimated capital costs on land and buildings for the East South Central division were distributed among value classes in proportion to the value of land and buildings. The allowance for capital costs on dwellings for the East South Central division was distributed among the value classes in proportion to the estimated value of dwellings as derived in the adjustment of line 20.

Line 28. Total interest allowance on capital investment in machinery and implements for the East South Central division was distributed among value classes in proportion to the Census-reported value of machinery and implements.

Line 29. Total interest allowances on capital investment in livestock for the East South Central division was distributed among value classes in proportion to the Census-reported value of livestock sold during 1939.

Line 30. From the unadjusted estimate of taxes on all owned land and buildings shown in line 17 was subtracted the estimated taxes allocable to dwellings. This was estimated as the same percentage of the entire dwellings adjustment to overhead expenses shown in line 20 as taxes comprised of the unadjusted overhead charges in the particular value class.